

## **EXHIBIT 1**

IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF DELAWARE

POWER INTEGRATIONS, INC.,  
a Delaware corporation,

Plaintiff,

v.

COGNIPOWER LLC,

Defendant.

Civ. No. 20-15-CFC

**POWER INTEGRATIONS' DISCLOSURE OF ASSERTED CLAIMS  
AND INFRINGEMENT CONTENTIONS**

Plaintiff Power Integrations, Inc. ("PI") submits the following infringement claim charts, attached hereto as Exhibits A ('011 patent) and B ('486 patent), which relate each representative accused product to the asserted claims. This disclosure of infringement claim charts is based upon information reasonably and presently available to PI, without the benefit of complete formal discovery, complete core technical document production from CogniPower, or any meaningful disclosures from CogniPower.

Because discovery has just begun, these disclosures are based solely upon publicly available information. PI's investigation of the matters disclosed in its Infringement Contentions is ongoing. PI anticipates that the production and review of documents and information by CogniPower may lead to the modification of these Infringement Contentions. Accordingly, PI reserves the right to amend, modify or supplement these disclosures based upon further discovery and investigation. PI reserves the right to amend, modify or supplement these Infringement Contentions based upon the manner in which the claim terms in the Patents-in-Suit are construed by the Court and/or based upon claim construction positions taken by CogniPower.

**(a) Infringed Claims**

PI asserts that CogniPower infringes claims 1, 8, 9, and 17 of U.S. Patent No. 9,374,011 (“the ’011 Patent”) as set forth in the following sections.

PI further asserts that CogniPower infringes claims 1-3, 5-9, 11, 13, 16-18, 20-23, and 25-26 of U.S. Patent No. 9,166,486 (“the ’486 Patent”), as set forth in the following sections.

The ’011 and ’486 Patents are collectively the “Patents-in-Suit.” The specific claims therein that CogniPower is accused of infringing are hereinafter collectively referred to as “Asserted Claims.”

**(b) Accused Products**

Based on the information presently available to PI, at least the following products are accused of infringing the following Asserted Claims of the Patents-in-Suit (the “Accused Products”):

- CogniPower’s “Demand Pulse Regulation (DPR)” power supply product, for example, as demonstrated in CogniPower’s 2019 APEC presentation entitled, “Simplifying Efficient Low Power AC/DC Converters” and accompanying prototype.

PI asserts that CogniPower has directly and/or indirectly infringed the Asserted Claims by making, using, offering for sale, selling and/or importing into the United States the Accused Products; and/or actively inducing others to use the Accused Products in an infringing manner; and/or otherwise contributing to the infringement of others.

Because discovery has just begun, PI reserves the right to add or modify the identification of the Accused Products to identify additional infringing apparatuses, products, devices, processes, methods, acts or other instrumentalities after conducting discovery in this matter.

**(c) Infringement Charts**

Subject to the above limitations, Exhibits A and B are claim charts setting forth the Asserted Claims of the Patents-in-Suit and how each Accused Product infringes the Asserted Claims. These charts also describe, by way of illustration, the features and/or functionalities of the Accused Products believed to infringe the Asserted Claims of the Patents-in-Suit.

Because discovery has just begun, PI reserves the right to add or modify the identification of the Accused Products to identify additional infringing apparatuses, products, devices, processes, methods, acts or other instrumentalities after conducting discovery in this matter.

**(d) Indirect Infringement**

PI asserts that CogniPower directly and/or indirectly infringes the Asserted Claims by making, using, offering for sale, selling and/or importing into the United States the Accused Products; and/or actively inducing others to use the Accused Products in an infringing manner; and/or otherwise contributing to the infringement of others. Because discovery has just begun, PI reserves the right to add or modify its bases for indirect infringement to include additional detail regarding CogniPower's acts that contribute to or are inducing the direct infringement.

**(e) Literal and/or Doctrine of Equivalents Infringement**

PI asserts that each element of each Asserted Claim is literally present in the Accused Products. To the extent that any elements of the Asserted Claims are not literally present, PI asserts that each element of the Asserted Claims is present under the doctrine of equivalents because any differences between the features of the Accused Products and the corresponding claim elements are insubstantial and/or that these features perform substantially the same functions in substantially the same way to achieve substantially the same result as the corresponding claim elements.

**(f) Priority**

The Asserted Claims of the Patents-in-Suit do not claim priority to any earlier application. PI contends that the claimed inventions were conceived of no later than June 10, 2011, and PI's inventors thereafter worked diligently to reduce them to practice.

**(g) Instrumentalities Practicing the Claimed Inventions**

The following Asserted Claims of the Patents-in-Suit are practiced by Power Integrations' InnoSwitch and InnoSwitch3 families of products:

**InnoSwitch:** '011 claims 1, 8, 9, 17; '486 claims 1-3, 5-8, 21-23, 25

**InnoSwitch3:** '011 claims 1, 9; '486 claims 1-3, 5-9, 11, 13, 16-18, 20-23, 25-26

**(h) Timing of First Infringement, Start & End of Claimed Damages**

PI identifies the timing of the point of first infringement of the Patents-in-Suit to be CogniPower's advertising and offer for sale of the Accused Products at the APEC convention in March 2019.

Damages for infringement of both of the Patents-in-suit start at the date the complaint was filed in this case, January 6, 2020.

PI damages as a result of CogniPower's infringement of the Patents-in-Suit are ongoing and will last until the expiration of the Patents-in-Suit, assuming continuing infringement by CogniPower.

**(i) Willful Infringement**

PI does not currently allege willful infringement. However, because discovery has just begun, PI reserves the right to assert willful infringement and amend this response to include the basis for such a claim.

**Document Production Accompanying Disclosure of Asserted Claims and  
Infringement Contentions**

Accompanying this statement, PI is producing and identifying relevant, non-privileged documents required under paragraph 6 of the Court's default Scheduling Order.

(a) N/A

(b) **Conception and Reduction to Practice:** PIC00000561 - PIC00001738;

PIC00003051 - PIC00003206.

(c) **File Histories:** PIC00002413 - PIC00002666; PIC00002671 - PIC00002901

(d) **Assignments:** PIC00002667 - PIC00002670; PIC00002902 - PIC00002905

(e) **PI Practicing Products' Documentation:** PIC00001739 - PIC00001847;

PIC00001849 - PIC00002412; PIC00002906 - PIC00003050.

PI reserves the right to supplement its production as deemed appropriate and necessary in the future, including when CogniPower provides relevant discovery.

Dated: October 26, 2020

FISH & RICHARDSON P.C.

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**ATTORNEYS FOR PLAINTIFF  
POWER INTEGRATIONS, INC.**

Exhibit A

Initial Claim Chart for U.S. Patent No. 9,374,011 (“the ‘011 Patent”)  
(Claim 1)

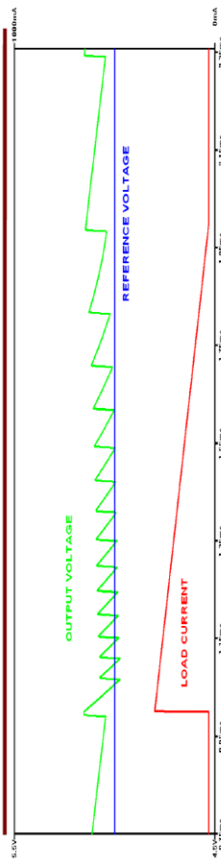
'011 Patent Claim	CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)
1. A secondary controller for use in a synchronous flyback converter, the secondary controller comprising:	<p>The DPR Product includes a secondary controller for use in a synchronous flyback converter. See APEC Presentation slide 10.</p> <p>Because the regulation intelligence resides on the secondary side, digital interfacing is straightforward</p> <p>Additional communication across the isolation barrier is not required when adding additional protocols</p> <p>There is no compensated feedback loop required for regulation so the output can be simply set to an arbitrary, digitally chosen voltage</p>  <p>© CogniPower, LLC 2019</p> <p>APEC Presentation at 10.</p>

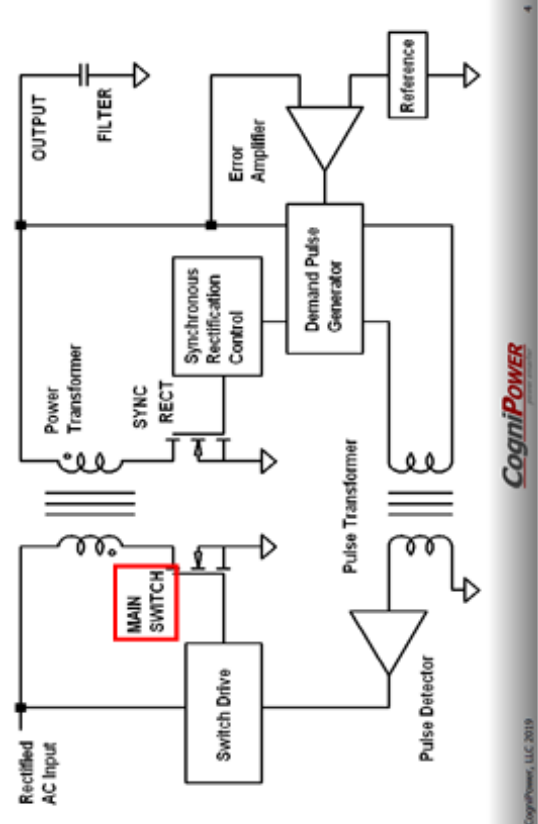


<p><b>'011 Patent Claim</b></p>	<p data-bbox="203 247 305 1528"><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <div data-bbox="326 804 345 1396"><p>Case 1:20-cv-00015-UNA Document 1-3 Filed 01/06/20 Page 12 of 21 PageID #: 76</p></div> <p data-bbox="342 982 386 1507"><i><b>Practicalities, Let's Get Real</b></i></p> <p data-bbox="418 760 492 1493">Switching in and out of continuous mode does not upset DPR control</p> <p data-bbox="524 701 597 1493">The signal transformer can be tiny, with a single stitch of wire each, for primary and secondary</p> <p data-bbox="630 701 816 1493">The primary side control chip can be a simplified version of an ordinary primary side control chip which needs only to generate one start-up pulse, to turn on the switch when a demand pulse is detected, and to shut off the switch at a preset current</p> <p data-bbox="849 701 930 1493"><b>The key to building a practical DPR power converter is the secondary side circuitry</b></p> <div data-bbox="946 667 987 1518"><p data-bbox="971 1417 982 1518">CogniPower, LLC 2019</p><p data-bbox="946 1024 979 1178"><i><b>CogniPower</b></i></p><p data-bbox="971 667 982 682">11</p></div> <p data-bbox="995 898 1027 1518">APEC Presentation at 11 (red annotation added).</p>
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[illegible]

<p>2011 Patent Claim</p>	<p>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</p>	<p><b>Block Diagram of DPR Power Converter</b></p> <p>© CogniPower, LLC 2019</p> <p><b>CogniPower</b></p> <p>APEC Presentation at 4 (annotation added).</p> <p>The error amplifier is coupled to generate a compare signal based on the comparison of a threshold (blue, labelled “Reference”) and an input signal (green) representative of the secondary winding voltage (shown as coupled to the secondary winding of the “Power Transformer” and input to the “Error Amplifier”), as shown in the APEC Presentation on slide 4.</p>
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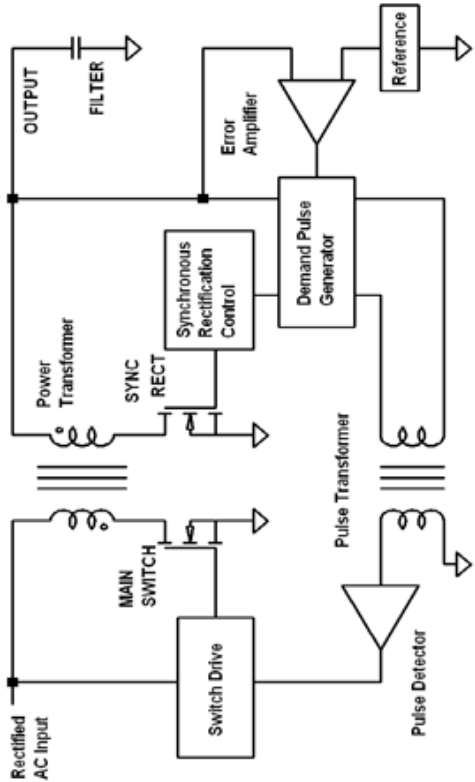
'011 Patent Claim	<p><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p>
	<p><b>DPR Performance</b></p>  <p>A simple 2-transistor error amplifier running on next-to-no power supply current produces good results</p> <p>A 30 to 300 mA load step is shown here</p> <p>The output voltage falls within a 200 mV envelope</p> <p>Tighter regulation requires only a little more supply current for the error amplifier</p> <p><b>CogniPower</b> CogniPower, LLC 2019 APEC Presentation at 8.</p> <p>The DPR Product includes a drive circuit coupled to generate a drive signal to control a first switch to be coupled to a primary side of the synchronous flyback converter, wherein the drive signal is coupled to be generated by the drive circuit in response to a feedback signal representative of an output of the synchronous flyback converter.</p> <p>The APEC Presentation states that “[t]he primary side side [sic] switch is turned on by demand pulses sent through the pulse transformer” and “[t]he decision to turn on the switch is made at the optimum point through a simple comparison.” See APEC Presentation at 5. The first switch may be the “MAIN SWITCH” of the DPR Block Diagram. See APEC Presentation at 4.</p>
a drive circuit coupled to generate a drive signal to control a first switch to be coupled to a primary side of the synchronous flyback converter, wherein the drive signal is coupled to be generated by the drive circuit in response to a feedback signal representative of an output	

'011 Patent Claim	<p>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</p>
<p>of the synchronous flyback converter; and</p>	<p><b><i>Block Diagram of DPR Power Converter</i></b></p>  <p>The diagram illustrates the architecture of a Demand Pulse Regulation (DPR) power converter. It begins with a 'Rectified AC Input' which passes through a 'MAIN SWITCH' (highlighted with a red box) and a 'Power Transformer'. The output of the transformer is connected to a 'SYNC RECT' block, which then feeds into a 'Synchronous Rectification Control' block. This control block is linked to a 'Demand Pulse Generator' and an 'Error Amplifier'. The 'Error Amplifier' also receives feedback from the 'OUTPUT' stage, which includes a 'FILTER'. The 'Demand Pulse Generator' provides a signal to a 'Switch Drive' block, which in turn controls the 'MAIN SWITCH'. A 'Pulse Detector' is connected to the output of the 'Switch Drive' and provides feedback to the 'Error Amplifier'. The 'Pulse Detector' is also connected to a 'Pulse Transformer' and a 'Reference' block. The diagram is labeled 'CogniPower' and '© CogniPower, LLC 2019'.</p> <p>APEC Presentation at 4 (red annotation added).</p> <p>The drive signal is generated by a drive circuit in response to a feedback signal representative of the output of the synchronous flyback converter. (See, e.g., APEC Presentation at slides 4-8.)</p> <p>The DPR Product includes logic circuitry coupled to the drive circuit and coupled to the comparator, wherein the logic circuitry is coupled to generate a control signal to control a second switch in response to the drive signal and in response to the compare signal, and wherein the second switch is to be coupled to a secondary side of the synchronous flyback converter.</p> <p>The recited logic circuitry may be found inside of the “Synchronous Rectification Control” block of the DPR Block Diagram, which generates a control signal to control a second switch, which by way of example only, may be the switch labelled “SYNC RECT”.</p>
<p>logic circuitry coupled to the drive circuit and coupled to the comparator, wherein the logic circuitry is coupled to generate a control signal to control a second switch in response to the drive signal and in response to the</p>	<p>logic circuitry coupled to the drive circuit and coupled to the comparator, wherein the logic circuitry is coupled to generate a control signal to control a second switch in response to the drive signal and in response to the</p>


<p><b>'011 Patent Claim</b></p> <p>compare signal, and wherein the second switch is to be coupled to a secondary side of the synchronous flyback converter.</p>	<p>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Rectification (“DPR Product”)</p> <div data-bbox="362 753 415 1472"> <p><i>Block Diagram of DPR Power Converter</i></p> </div> <p>APEC Presentation at 4 (red annotation added).</p> <p>The recited drive signal is generated in response to the drive signal and the compare signal, for example as shown in the DPR Block Diagram, and as described in the APEC Presentation: “Advance notice from secondary side control for when the primary side switch is about to turn on enables simpler, more efficient synchronous rectification.” (APEC Presentation at slide 16.)</p>
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'011 Patent Claim	<p data-bbox="201 247 305 1520"><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <div data-bbox="332 667 990 1501"> <p data-bbox="332 804 354 1388">Case 1:20-cv-00015-UNA Document 1-3 Filed 01/06/20 Page 17 of 21 PageID #: 81</p> <p data-bbox="345 869 394 1501"><i>Summary of DPR Efficiency Gains</i></p> <p data-bbox="423 711 500 1486">Ultra-low standby power enables unmatched low load efficiency</p> <div data-bbox="524 701 651 1495" style="border: 2px solid red; padding: 5px;"> <p data-bbox="529 716 643 1486">Advance notice from secondary side control for when the primary side switch is about to turn on enables simpler, more efficient synchronous rectification</p> </div> <p data-bbox="672 697 786 1486">Uncompromised power transformer design enables better coupling, and therefore less need for dissipative snubbing</p> <p data-bbox="816 730 927 1486">Simple, efficient circuitry means less waste heat, smaller size, higher reliability, and most importantly, <b>lower cost</b></p> <div data-bbox="941 667 987 1514">  <p data-bbox="971 1409 984 1514">CogniPower, LLC 2019</p> </div> <p data-bbox="997 898 1026 1520">APEC Presentation at 16 (red annotation added).</p> </div>
<p data-bbox="1049 1543 1114 1898">8. The secondary controller of claim 1 further comprising an oscillator coupled to generate a clock signal coupled to be received by the drive circuit, wherein the drive circuit is coupled to generate the drive signal in response to the clock signal.</p>	<p data-bbox="1049 1278 1078 1520">See claim 1 above.</p> <p data-bbox="1122 205 1227 1520">The DPR Product includes the secondary controller of claim 1 further comprising an oscillator coupled to generate a clock signal coupled to be received by the drive circuit, wherein the drive circuit is coupled to generate the drive signal in response to the clock signal.</p> <p data-bbox="1268 233 1406 1520">CogniPower has taken the position that the DPR Product is an embodiment of CogniPower’s patent RE47,031 (the “’031 patent”). The ’031 patent discloses “an oscillator coupled to generate a clock signal coupled to be received by the drive circuit, wherein the drive circuit is coupled to generate the drive signal in response to the clock signal.” See, e.g., ’031 patent at Fig. 4; 7:54-8:38. Based on</p>

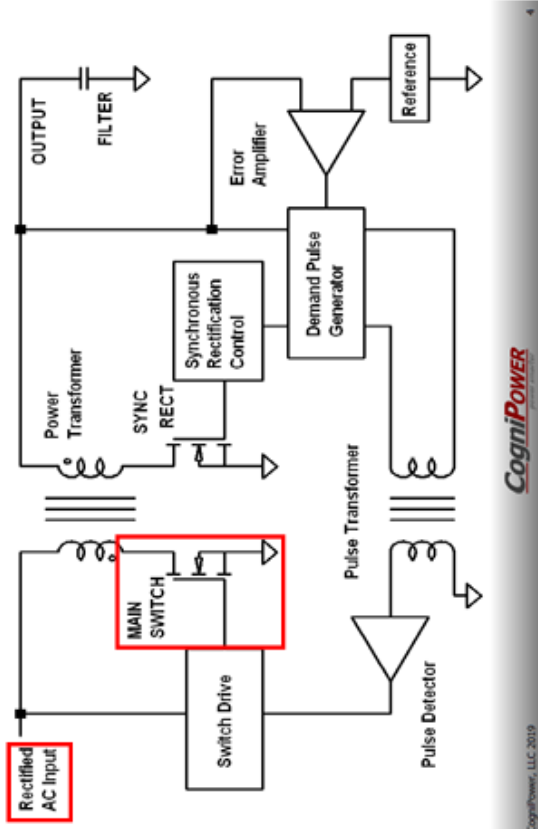



'011 Patent Claim	CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)
	Opticurrent’s contention, it appears that the secondary controller of the DPR Product includes the recited oscillator.
9. A power converter, comprising:	<p data-bbox="410 932 443 1518">The DPR Product includes a power converter.</p> <p data-bbox="492 751 540 1465"><i>Block Diagram of DPR Power Converter</i></p>  <p data-bbox="1068 667 1109 1518">© CogniPower, LLC 2019 CogniPower 4</p> <p data-bbox="1117 919 1149 1518">APEC Presentation at 4 (red annotation added).</p>




'011 Patent Claim	CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)
	<p><u><i>Demand Pulse Regulation (DPR) Fits the Bill</i></u></p> <p>Demand Pulse Regulation is a new approach to low-power AC/DC supplies</p> <p>DPR provides the simplest, most robust structure yet devised for controlling such power converters</p> <p>Most of the control is on the secondary side, where the electrical environment is easier to deal with</p> <p>Regulation and transient response are uncompromised and digital interfacing is easy</p>  <p>APEC Presentation at 3 (red annotation added).</p>
an energy transfer element having a primary winding and a secondary winding;	The DPR Product includes an energy transfer element having a primary winding and a secondary winding.

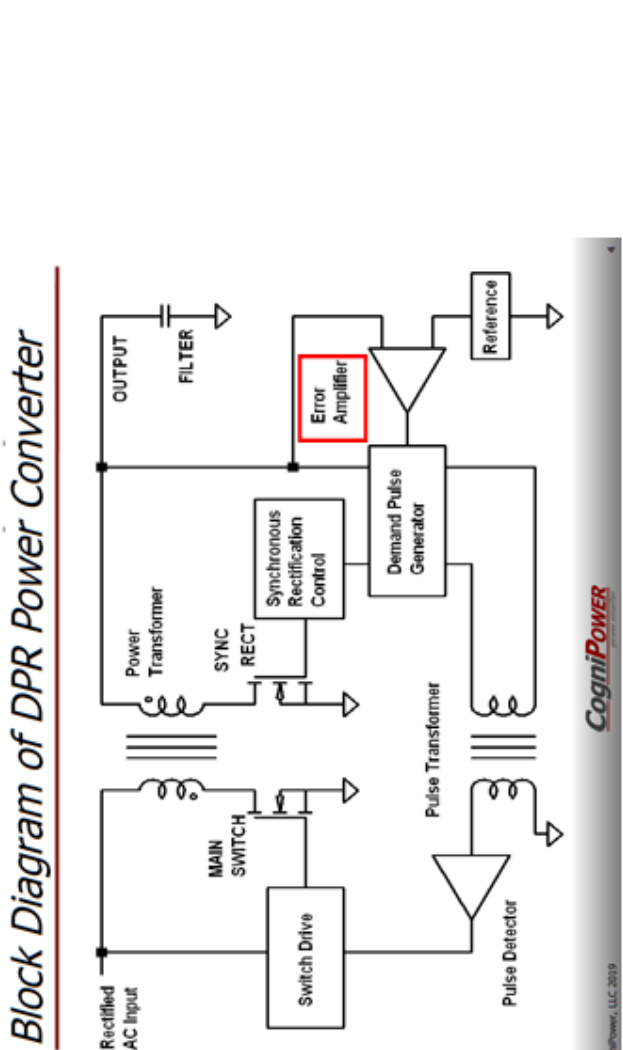
<p>'011 Patent Claim</p>	<p>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</p>
	<p>The diagram illustrates the architecture of a Demand Pulse Regulation (DPR) power converter. It features a central "Power Transformer" with two windings: a "Primary winding" and a "Secondary winding". The "Rectified AC Input" feeds into the primary winding. A red box highlights the transformer core and both windings, labeled as the "Energy transfer element". The primary winding is connected to a "MAIN SWITCH" driven by a "Switch Drive" unit. The secondary winding outputs to a "RECT" (rectifier) stage, which includes a "SYNC" signal input from a "Synchronous Rectification Control" block. This control block also receives feedback from the "OUTPUT FILTER". The output of the rectifier goes through a "Pulse Detector" and a "Pulse Transformer" to a "Demand Pulse Generator". This generator provides a pulse-width modulated (PWM) signal to the "MAIN SWITCH" and a reference signal to an "Error Amplifier". The error amplifier compares the output voltage with a "Reference" value.</p>
<p>a first switch coupled to the primary winding and coupled to an input of the power converter; and</p>	<p>APEC Presentation at 4 (red annotation added). The DPR Product includes a first switch coupled to the primary winding and coupled to an input of the power converter.</p>

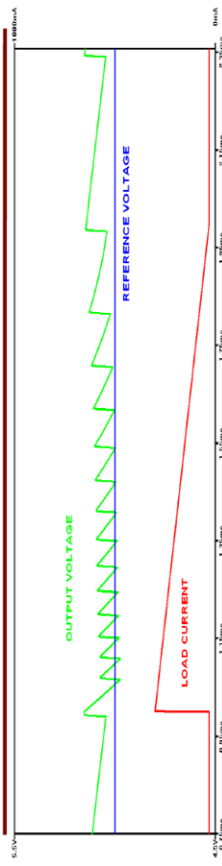
'011 Patent Claim	CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")
	<p><i>Block Diagram of DPR Power Converter</i></p>  <p>The diagram illustrates the architecture of a DPR Power Converter. It begins with a 'Rectified AC Input' (highlighted with a red box) which feeds into a 'MAIN SWITCH' (also highlighted with a red box). The output of the main switch goes through a 'Power Transformer' and a 'SYNC RECT' block. This is followed by a 'Synchronous Rectification Control' block, which is connected to a 'Demand Pulse Generator'. The generator's output goes through a 'Pulse Transformer' and a 'Pulse Detector' block. The pulse detector's output is fed into an 'Error Amplifier', which then provides feedback to the 'Demand Pulse Generator'. The final output of the converter is an 'OUTPUT FILTER' leading to the 'OUTPUT'. A 'Reference' input is also shown connected to the error amplifier. The diagram is signed 'CogniPOWER' and includes a small number '4' in the bottom right corner.</p> <p>APEC Presentation at 4 (red annotation added).</p>
a secondary controller coupled to control switching of the first switch to control a transfer of energy through the energy transfer element from the input of the power converter to an output of the power converter, the secondary controller including:	<p>The DPR Product includes a secondary controller coupled to control switching of the first switch to control a transfer of energy through the energy transfer element from the input of the power converter to an output of the power converter.</p>

<p><b>'011 Patent Claim</b></p>	<p><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <p>Because the regulation intelligence resides on the secondary side, digital interfacing is straightforward</p> <p>Additional communication across the isolation barrier is not required when adding additional protocols</p> <p>There is no compensated feedback loop required for regulation so the output can be simply set to an arbitrary, digitally chosen voltage</p>  <p>© CogniPower, LLC 2019</p> <p>APEC Presentation at 10.</p>
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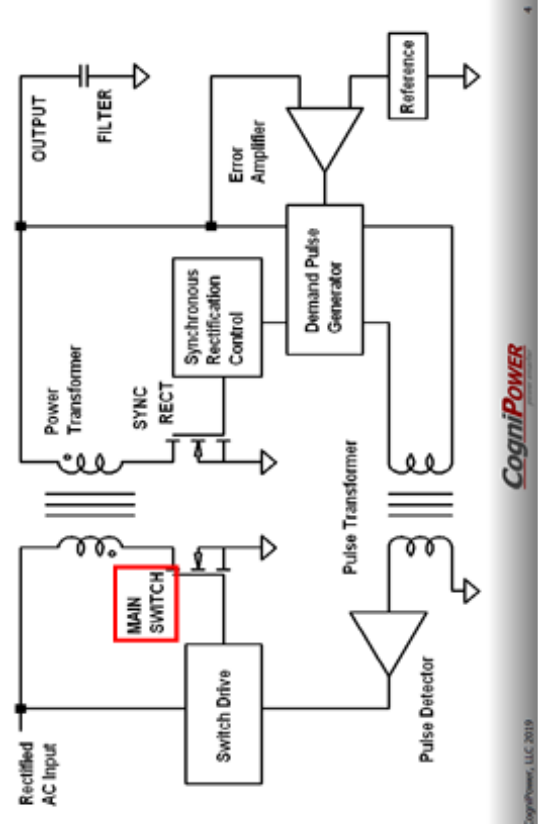
'011 Patent Claim	<p data-bbox="201 247 305 1528"><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <p data-bbox="331 802 347 1398">Case 1:20-cv-00015-UNA Document 1-3 Filed 01/06/20 Page 12 of 21 PageID #: 76</p> <p data-bbox="341 982 386 1507"><b><i>Practicalities, Let's Get Real</i></b></p> <p data-bbox="418 760 490 1495">Switching in and out of continuous mode does not upset DPR control</p> <p data-bbox="522 701 594 1495">The signal transformer can be tiny, with a single stitch of wire each, for primary and secondary</p> <p data-bbox="626 709 815 1495">The primary side control chip can be a simplified version of an ordinary primary side control chip which needs only to generate one start-up pulse, to turn on the switch when a demand pulse is detected, and to shut off the switch at a preset current</p> <p data-bbox="847 701 925 1495"><b>The key to building a practical DPR power converter is the secondary side circuitry</b></p> <p data-bbox="945 667 984 1516">  11 </p> <p data-bbox="993 898 1026 1516">APEC Presentation at 11 (red annotation added).</p>
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<p>'011 Patent Claim</p>	<p>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</p>
<p><i>Block Diagram of DPR Power Converter</i></p> <p>© CogniPower, LLC 2019</p> <p><b>CogniPower</b></p> <p>APEC Presentation at 4 (red annotation added).</p>	<p>The DPR Product includes a comparator coupled to generate a compare signal in response to a comparison of a threshold to an input signal representative of a secondary winding voltage of the secondary winding.</p>
<p>a comparator coupled to generate a compare signal in response to a comparison of a threshold to an input signal representative of a secondary winding voltage of the secondary winding;</p>	<p>The DPR Product includes a comparator coupled to generate a compare signal in response to a comparison of a threshold to an input signal representative of a secondary winding voltage of the secondary winding.</p>


<p>2011 Patent Claim</p>	<div data-bbox="194 205 311 1883"> <p>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</p> </div> <div data-bbox="311 205 1188 1883"> <p><i>Block Diagram of DPR Power Converter</i></p>  <p>The diagram illustrates the architecture of a DPR Power Converter. It begins with a 'Rectified AC Input' which feeds into a 'MAIN SWITCH' and a 'Power Transformer'. The 'MAIN SWITCH' is controlled by a 'Switch Drive' block, which in turn receives input from a 'Pulse Detector'. The 'Power Transformer' is coupled to a 'SYNC RECT' block, which is connected to a 'Synchronous Rectification Control' block. This control block is linked to a 'Demand Pulse Generator'. The output of the 'Demand Pulse Generator' is fed into an 'Error Amplifier' (highlighted with a red box in the original image). The 'Error Amplifier' also receives a 'Reference' signal. The output of the 'Error Amplifier' is connected to a 'Pulse Transformer', which is coupled to a 'Pulse Detector'. The 'Pulse Detector' output is fed back to the 'Switch Drive'. The final output of the system is an 'OUTPUT FILTER'.</p> <p>APEC Presentation at 4 (red annotation added).</p> <p>The error amplifier is coupled to generate a compare signal based on the comparison of a threshold (labelled “Reference”) and an input signal representative of the secondary winding voltage (shown as coupled to the secondary winding of the “Power Transformer” and input to the “Error Amplifier”), as shown in the APEC Presentation on slide 4.</p> </div>
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'011 Patent Claim	<p>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</p>
	<p><b>DPR Performance</b></p>  <p>A simple 2-transistor error amplifier running on next-to-no power supply current produces good results</p> <p>A 30 to 300 mA load step is shown here</p> <p>The output voltage falls within a 200 mV envelope</p> <p>Tighter regulation requires only a little more supply current for the error amplifier</p> <p><b>CogniPower</b> CogniPower, LLC 2019 APEC Presentation at 8.</p>
a drive circuit coupled to generate a drive signal to control the first switch, wherein the drive signal is coupled to be generated by the drive circuit in response to a feedback signal representative of the output of the power converter; and	<p>The DPR Product includes a drive circuit coupled to generate a drive signal to control the first switch, wherein the drive signal is coupled to be generated by the drive circuit in response to a feedback signal representative of the output of the power converter.</p> <p>The APEC Presentation states that “[t]he primary side side [sic] switch is turned on by demand pulses sent through the pulse transformer” and “[t]he decision to turn on the switch is made at the optimum point through a simple comparison.” See APEC Presentation at 5. The first switch may be the “MAIN SWITCH” of the DPR Block Diagram. See APEC Presentation at 4.</p>



'011 Patent Claim	CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")
<p>logic circuitry coupled to the drive circuit and coupled to the comparator, wherein the logic circuitry is coupled to generate a control signal to control a second switch in response to the drive</p>	<p><b>Block Diagram of DPR Power Converter</b></p>  <p>The diagram illustrates the architecture of a DPR Power Converter. It begins with a 'Rectified AC Input' which passes through a 'MAIN SWITCH' (highlighted with a red box) and a 'Power Transformer'. The output of the transformer is connected to a 'SYNC RECT' block, which then feeds into a 'Synchronous Rectification Control' block. This control block is linked to a 'Demand Pulse Generator' and an 'Error Amplifier'. The 'Error Amplifier' also receives a 'Reference' signal. The 'Demand Pulse Generator' outputs to a 'Pulse Transformer' and a 'Pulse Detector'. The 'Pulse Detector' is connected to a 'Switch Drive' block, which in turn controls the 'MAIN SWITCH'. The output of the 'Power Transformer' also passes through an 'OUTPUT FILTER' before reaching the final 'OUTPUT'. The CogniPower logo and '© CogniPower, LLC 2019' are visible at the bottom of the diagram.</p> <p>APEC Presentation at 4 (red annotation added).</p> <p>The drive signal is generated by a drive circuit in response to a feedback signal representative of the output of the synchronous flyback converter. (See, e.g., APEC Presentation at slides 4-8.)</p>
<p>logic circuitry coupled to the drive circuit and coupled to the comparator, wherein the logic circuitry is coupled to generate a control signal to control a second switch in response to the drive</p>	<p>The DPR Product includes logic circuitry coupled to the drive circuit and coupled to the comparator, wherein the logic circuitry is coupled to generate a control signal to control a second switch in response to the drive signal and in response to the compare signal, and wherein the second switch is coupled to a secondary side of the power converter.</p>

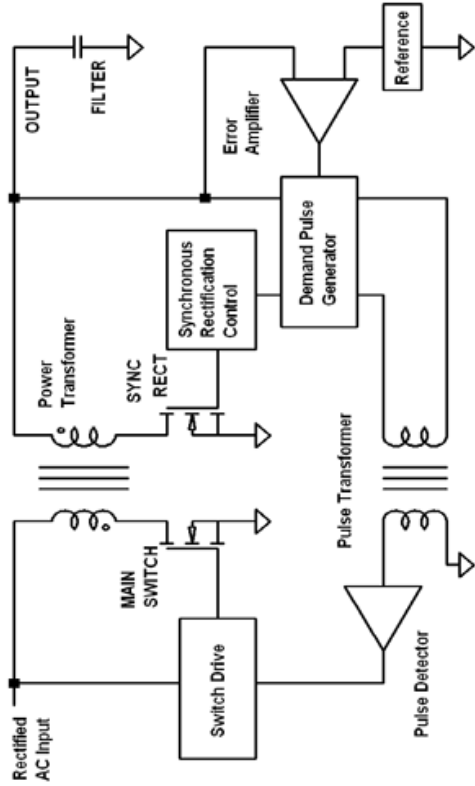



'011 Patent Claim	<p data-bbox="201 247 305 1520"><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <div data-bbox="332 667 987 1501"> <p data-bbox="332 804 354 1388"><small>Case 1:20-cv-00015-UNA Document 1-3 Filed 01/06/20 Page 17 of 21 PageID #: 81</small></p> <p data-bbox="345 867 394 1501"><i><b>Summary of DPR Efficiency Gains</b></i></p> <p data-bbox="423 709 500 1486">Ultra-low standby power enables unmatched low load efficiency</p> <div data-bbox="521 701 651 1495" style="border: 2px solid red; padding: 5px;"> <p data-bbox="529 716 643 1486">Advance notice from secondary side control for when the primary side switch is about to turn on enables simpler, more efficient synchronous rectification</p> </div> <p data-bbox="672 699 786 1486">Uncompromised power transformer design enables better coupling, and therefore less need for dissipative snubbing</p> <p data-bbox="813 730 927 1486">Simple, efficient circuitry means less waste heat, smaller size, higher reliability, and most importantly, <b>lower cost</b></p> <div data-bbox="938 667 987 1516">  <p data-bbox="971 1409 984 1516"><small>CogniPower, LLC 2019</small></p> <p data-bbox="971 667 984 684"><small>16</small></p> </div> <p data-bbox="997 898 1029 1520">APEC Presentation at 16 (red annotation added).</p> </div>
<p data-bbox="1049 1541 1365 1896">17. The power converter of claim 9 wherein the secondary controller further comprises an oscillator coupled to generate a clock signal coupled to be received by the drive circuit, wherein the drive circuit is coupled to</p>	<p data-bbox="1049 1276 1081 1520">See claim 9 above.</p> <p data-bbox="1122 233 1227 1520">The DPR Product includes the power converter of claim 9 wherein the secondary controller further comprises an oscillator coupled to generate a clock signal coupled to be received by the drive circuit, wherein the drive circuit is coupled to generate the drive signal in response to the clock signal.</p> <p data-bbox="1268 275 1373 1520">CogniPower has taken the position that the DPR Product is an embodiment of CogniPower's '031 patent. The '031 patent discloses “an oscillator coupled to generate a clock signal coupled to be received by the drive circuit, wherein the drive circuit is coupled to generate the drive signal in</p>

'011 Patent Claim	CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)
generate the drive signal in response to the clock signal.	response to the clock signal.” <i>See, e.g.</i> , ’031 patent at Fig. 4; 7:54-8:38. Based on Opticurrent’s contention, it appears that the secondary controller of the DPR Product includes the recited oscillator.

## Exhibit B

Initial Claim Chart for U.S. Patent No. 9,166,486 (“the ‘486 Patent”)  
(Claim 1)

'486 Patent Claim	CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)
1. A power converter controller comprising:	<p>The DPR Product includes a power converter controller.</p> <p><i>Block Diagram of DPR Power Converter</i></p>  <p>The diagram illustrates the architecture of the DPR Power Converter. It begins with a 'Rectified AC Input' which passes through a 'MAIN SWITCH' and a 'Power Transformer'. The output of the power transformer is connected to a 'SYNC RECT' block, which then feeds into a 'Synchronous Rectification Control' block. This control block is linked to a 'Demand Pulse Generator' and an 'Error Amplifier'. The 'Error Amplifier' also receives input from a 'Reference' block. The 'Demand Pulse Generator' outputs to a 'Pulse Transformer', which is connected to a 'Pulse Detector'. The 'Pulse Detector' provides feedback to the 'Error Amplifier'. The output of the 'Pulse Transformer' is connected to an 'OUTPUT FILTER'.</p> <p>© CogniPower, LLC 2019</p> <p><b>CogniPOWER</b></p> <p>4</p> <p>APEC Presentation at 4 (red annotation added).</p>

'486 Patent Claim	<p data-bbox="199 321 310 1413"><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <p data-bbox="329 583 378 1402"><b><u>Demand Pulse Regulation (DPR) Fits the Bill</u></b></p> <p data-bbox="435 625 508 1371">Demand Pulse Regulation is a new approach to low-power AC/DC supplies</p> <p data-bbox="548 657 630 1371">DPR provides the simplest, most robust structure yet devised for controlling such power converters</p> <p data-bbox="654 636 727 1371">Most of the control is on the secondary side, where the electrical environment is easier to deal with</p> <p data-bbox="768 720 849 1371">Regulation and transient response are uncompromised and digital interfacing is easy</p> <div data-bbox="914 562 963 1413">  <p data-bbox="946 1308 963 1413">CogniPower, LLC 2019</p> <p data-bbox="922 919 946 1066"><b>CogniPower</b></p> <p data-bbox="946 573 963 594">3</p> </div> <p data-bbox="971 814 1003 1413">APEC Presentation at 3 (red annotation added).</p> <p data-bbox="1044 405 1109 1413">In addition, the power converter controller is embodied in the physical products shown in the APEC Presentation.</p>
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<p><b>'486 Patent Claim</b></p>	<p><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p>
	<div data-bbox="344 674 862 1396" data-label="Image"> </div> <div data-bbox="873 793 930 1257" data-label="Section-Header"> <h3>Early DPR Prototype</h3> </div> <div data-bbox="927 1081 964 1417" data-label="Text"> <p>APEC Presentation at 20.</p> </div> <div data-bbox="1002 613 1380 1411" data-label="Image"> </div> <div data-bbox="1377 1081 1414 1417" data-label="Text"> <p>APEC Presentation at 10.</p> </div>



<p><b>'486 Patent Claim</b></p>	<p><b>CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")</b></p>
<p>a primary controller to be coupled to a power switch of a power converter, wherein the primary controller is coupled to receive one or more request signals and transition the power switch from an OFF state to an ON state in response to each of the one or more received request signals, and wherein the primary controller is coupled to detect a turn-off condition when the power switch is in the ON state and transition the power switch from the ON state to the OFF state in response to detection of the turn-off condition;</p> <p>and</p>	<p>The DPR Product includes a primary controller to be coupled to a power switch of a power converter, wherein the primary controller is coupled to receive one or more request signals and transition the power switch from an OFF state to an ON state in response to each of the one or more received request signals, and wherein the primary controller is coupled to detect a turn-off condition when the power switch is in the ON state and transition the power switch from the ON state to the OFF state in response to detection of the turn-off condition.</p> <p>The "one or more request signals" are analogous to the DPR Product's "Demand pulses," shown below in slide 5 of the APEC Presentation. The DPR Product includes circuitry wherein the primary controller is coupled to receive one or more request signals and transition the power switch from an OFF state to an ON state in response to each of the one or more received request signals. For example, according to the APEC Presentation, "[t]he primary side side (sic) switch is turned on by demand pulses sent through the pulse transformer."</p>



**'486 Patent Claim**

**CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)**

Case 1:20-cv-00015-UNA Document 1-3 Filed 01/06/20 Page 6 of 21 PageID #: 70

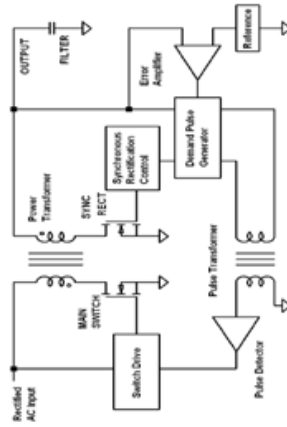
### *How Does it Work?*

**The primary side switch is turned on by demand pulses sent through the pulse transformer**

The primary side switch is turned off by the switch drive control on the basis of the primary current or time

The decision to turn on the switch is made at the optimum point through a simple comparison

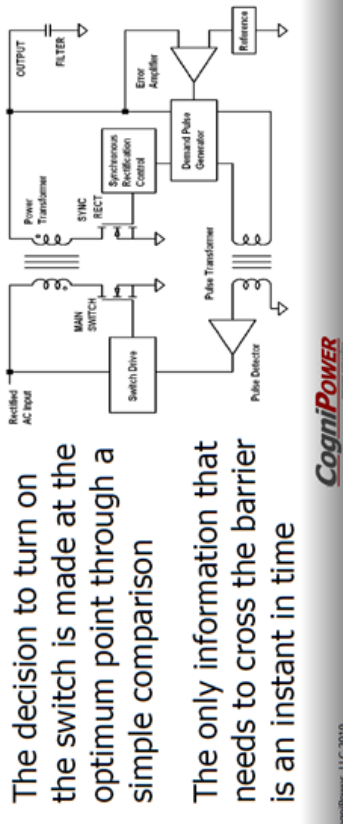
The only information that needs to cross the barrier is an instant in time



CogniPower, LLC 2019  
**CogniPOWER**  
5

APEC Presentation at 5 (red annotation added).

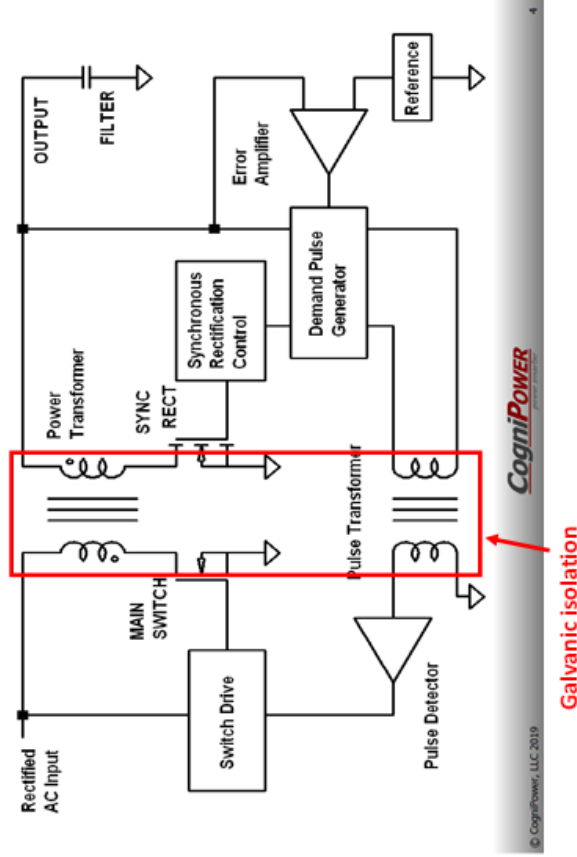
Further, the DPR Product includes circuitry “wherein the primary controller is coupled to detect a turn-off condition when the power switch is in the ON state and transition the power switch from the ON state to the OFF state in response to detection of the turn-off condition.”

<p><b>'486 Patent Claim</b></p>	<p><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p>
	<p style="text-align: center;">Case 1:20-cv-00015-UNA Document 1-3 Filed 01/06/20 Page 6 of 21 PageID #: 70</p> <p style="text-align: center;"><b><i>How Does it Work?</i></b></p> <p>The primary side switch is turned on by demand pulses sent through the pulse transformer</p> <p><b>The primary side switch is turned off by the switch drive control on the basis of the primary current or time</b></p> <p>The decision to turn on the switch is made at the optimum point through a simple comparison</p> <p>The only information that needs to cross the barrier is an instant in time</p>  <p>APEC Presentation at 5 (red annotation added).</p>
<p>a secondary controller galvanically isolated from the primary controller, wherein the secondary controller is coupled to transmit the one or more request signals to the primary controller, and wherein the secondary controller is coupled to control an amount of time between the transmission of each of the request signals,</p>	<p>The DPR Product includes a secondary controller galvanically isolated from the primary controller, wherein the secondary controller is coupled to transmit the one or more request signals to the primary controller, and wherein the secondary controller is coupled to control an amount of time between the transmission of each of the request signals.</p> <p>The secondary controller is galvanically isolated from the primary controller.</p>

'486 Patent Claim

CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")

### Block Diagram of DPR Power Converter



APEC Presentation at 4 (red annotation added).

The secondary controller is coupled to transmit the one or more request signals to the primary controller:

**'486 Patent Claim**

**CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)**

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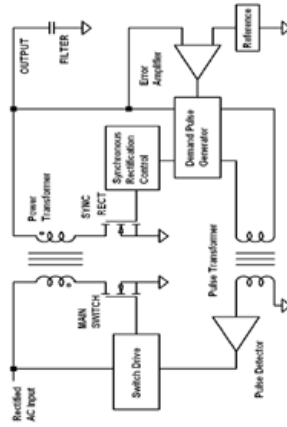
### *How Does it Work?*

The primary side switch is turned on by demand pulses sent through the pulse transformer

The primary side switch is turned off by the switch drive control on the basis of the primary current or time

The decision to turn on the switch is made at the optimum point through a simple comparison

The only information that needs to cross the barrier is an instant in time



CogniPower, LLC 2019  
**CogniPOWER**

APEC Presentation at 5 (red annotation added).

The secondary controller of the DPR product is coupled to control an amount of time between the transmission of each of the request signals: “Whenever the instantaneous output falls below the regulation point, a demand pulse is generated.”

**'486 Patent Claim**

**CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)**

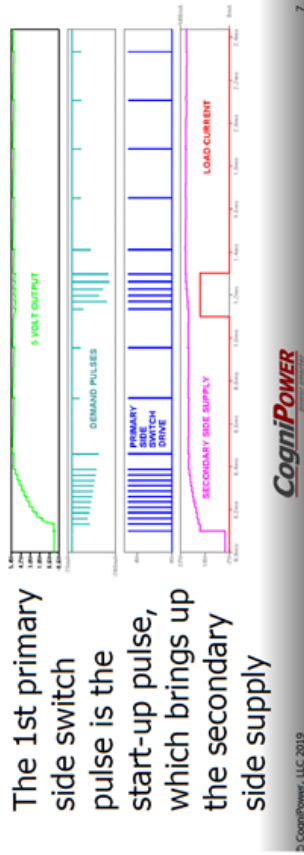
### *DPR Waveforms Explained*

Whenever the instantaneous output falls below the regulation point, a demand pulse is generated


At the left, during start-up, the demand pulses are sent at the maximum frequency allowed

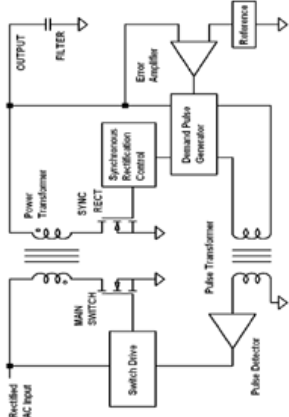
Demand pulses are seen to spread out at low load

The 1st primary side switch pulse is the start-up pulse, which brings up the secondary side supply



APEC Presentation at 7 (red annotation added).

'486 Patent Claim	CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")
	<p><b><i>Functions Provided by the DP Generator</i></b></p> <p>The DPG makes a very fast current pulse from a slowly changing error signal, while using practically no power</p> <p>That very fast edge propagates easily through a minimal, inexpensive, non-critical pulse transformer</p> <p>The DPG sets the maximum frequency of operation</p> <p>The DPG output frequency is in proportion to the magnitude of the error signal, allowing smooth operation, even into and out of continuous conduction</p> <p>And, the DPG itself does not require regulated power</p> <div data-bbox="906 552 959 1413">  <p>CogniPower, LLC 2019 13</p> </div> <p>APEC Presentation at 13.</p>
wherein the turn-off condition is a threshold current limit and the primary controller is coupled to adjust the threshold current limit in response to an amount of time the power switch is in the ON state.	<p>The DPR Product includes wherein the turn-off condition is a threshold current limit and the primary controller is coupled to adjust the threshold current limit in response to an amount of time the power switch is in the ON state.</p> <p>The recited "turn-off condition" may be based on the primary side switch current or time: "The primary side switch is turned off by the switch drive control on the basis of the primary current or time." (APEC Presentation at slide 5.)</p>

<p><b>'486 Patent Claim</b></p>	<p><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <p>Case 1:20-cv-00015-UNA Document 1-3 Filed 01/06/20 Page 6 of 21 PageID #: 70</p> <p><b><i>How Does it Work?</i></b></p> <p>The primary side switch is turned on by demand pulses sent through the pulse transformer</p> <p>The primary side switch is turned off by the switch drive control on the basis of the primary current or time</p> <p>The decision to turn on the switch is made at the optimum point through a simple comparison</p> <p>The only information that needs to cross the barrier is an instant in time</p>  <p>APEC Presentation at 5 (red annotation added); see also APEC Presentation at 11.</p>
<p>2. The power converter controller of claim 1, wherein the primary controller is configured to be coupled to a primary side of the power converter, wherein the primary controller is coupled to receive the one or more request signals from a secondary side of the power converter, and wherein the secondary controller is configured to</p>	<p>See claim 1 above.</p> <p>The DPR Product includes the power converter controller of claim 1, wherein the primary controller is configured to be coupled to a primary side of the power converter, wherein the primary controller is coupled to receive the one or more request signals from a secondary side of the power converter, and wherein the secondary controller is configured to be coupled to the secondary side of the power converter.</p>



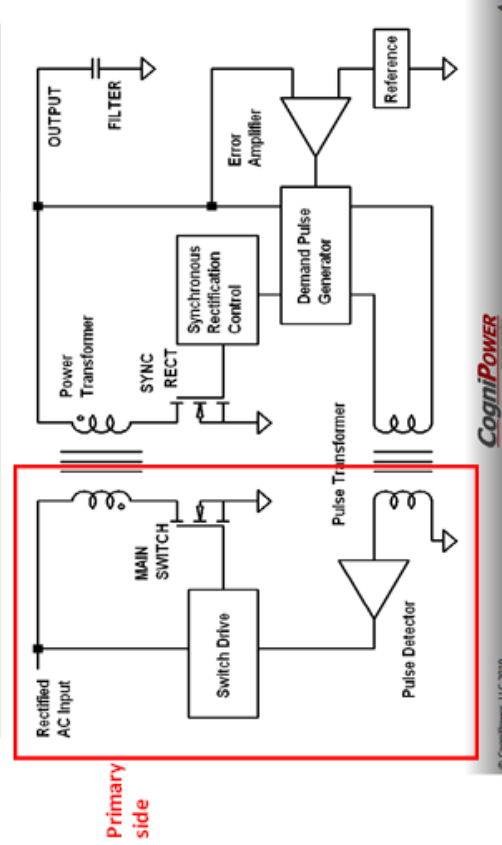
**'486 Patent Claim**

be coupled to the secondary side of the power converter.

**CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)**

The rectified primary controller is configured to be coupled to the primary side of the power converter.

*Block Diagram of DPR Power Converter*



APEC Presentation at 4 (red annotation added).



**'486 Patent Claim**

**CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)**

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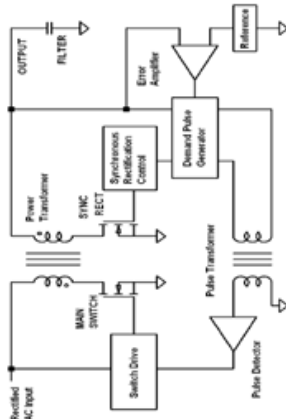
### *How Does it Work?*

**The primary side switch is turned on by demand pulses sent through the pulse transformer**

The primary side switch is turned off by the switch drive control on the basis of the primary current or time

The decision to turn on the switch is made at the optimum point through a simple comparison

The only information that needs to cross the barrier is an instant in time



CogniPower, LLC 2019

**CogniPower**

APEC Presentation at 5 (red annotation added).

The primary controller is coupled to receive the one or more request signals from a secondary side of the power converter.

**'486 Patent Claim**

**CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)**

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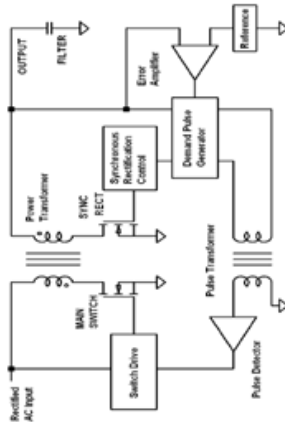
### *How Does it Work?*

**The primary side switch is turned on by demand pulses sent through the pulse transformer**

The primary side switch is turned off by the switch drive control on the basis of the primary current or time

The decision to turn on the switch is made at the optimum point through a simple comparison

The only information that needs to cross the barrier is an instant in time




CogniPower, LLC 2019 **CogniPower** 5

APEC Presentation at 5 (red annotation added).

The secondary controller is configured to be coupled to the secondary side of the power converter.

<p>’486 Patent Claim</p>	<p>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</p> <p><i>Block Diagram of DPR Power Converter</i></p> <p>APEC Presentation at 5 (red annotation added).</p> <p>See claim 1 above.</p> <p>The DPR Product includes the power converter controller of claim 1, wherein the secondary controller includes a timing circuit that sets a minimum amount of time between the transmission of each of the one or more request signals.</p> <p>The maximum frequency of the demand pulses sets a minimum time between transmission of request signals.</p>	<p>3. The power converter controller of claim 1, wherein the secondary controller includes a timing circuit that sets a minimum amount of time between the transmission of each of the one or more request signals.</p>
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'486 Patent Claim	<p data-bbox="203 321 308 1409"><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <p data-bbox="344 590 389 1371"><b><i>Functions Provided by the DP Generator</i></b></p> <p data-bbox="451 548 527 1371">The DPG makes a very fast current pulse from a slowly changing error signal, while using practically no power</p> <p data-bbox="560 596 636 1371">That very fast edge propagates easily through a minimal, inexpensive, non-critical pulse transformer</p> <p data-bbox="669 596 711 1371"><b>The DPG sets the maximum frequency of operation</b></p> <p data-bbox="738 558 854 1371">The DPG output frequency is in proportion to the magnitude of the error signal, allowing smooth operation, even into and out of continuous conduction</p> <p data-bbox="886 575 922 1371">And, the DPG itself does not require regulated power</p> <div data-bbox="964 485 1045 1409">  <p data-bbox="989 1278 1005 1409">© CogniPower, LLC 2019</p> <p data-bbox="1013 791 1045 1409">APEC Presentation at 13 (red annotation added).</p> </div> <p data-bbox="1086 317 1338 1409">CogniPower has taken the position that the DPR Product is an embodiment of CogniPower’s patent RE47,031 (the “’031 patent”). Based on CogniPower’s contention, the recited timing circuit is also shown in the ’031 patent, which recites, for example, an “output-side blocking oscillator 503b.” (See, e.g., ’031 patent at 5:23-30). The timing circuit includes an oscillator that sets a minimum amount of time between the transmission of each of the one or more request signals. See, e.g., ’031 patent at 5:13-60; 7:38-46.</p>
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'486 Patent Claim	CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")
<p>5. The power converter controller of claim 1, wherein the primary controller is coupled to: detect an amount of current through the power switch while the power switch is in the ON state; determine when the amount of current through the power switch is greater than the threshold current limit; and transition the power switch from the ON state to the OFF state when the amount of current through the power switch is greater than the threshold current limit.</p>	<p>See claim 1 above.</p> <p>The DPR Product includes the power converter controller of claim 1, wherein the primary controller is coupled to: detect an amount of current through the power switch while the power switch is in the ON state; determine when the amount of current through the power switch is greater than the threshold current limit; and transition the power switch from the ON state to the OFF state when the amount of current through the power switch is greater than the threshold current limit.</p> <p>The primary controller transitions the power switch from an ON to OFF state using the current in the primary power switch.</p>

**'486 Patent Claim**

**CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)**

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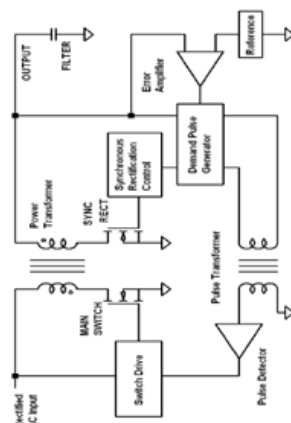
### ***How Does it Work?***

The primary side switch is turned on by demand pulses sent through the pulse transformer

The primary side switch is turned off by the switch drive control on the basis of the primary current or time

The decision to turn on the switch is made at the optimum point through a simple comparison

The only information that needs to cross the barrier is an instant in time




**CogniPower**

CogniPower, LLC 2019

APEC Presentation at 5 (red annotation added).

The power converter controller uses a preset current as a threshold current limit to determine when to turn off the power converter controller.

'486 Patent Claim	<p data-bbox="201 321 308 1411"><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <p data-bbox="329 699 347 1287"><small>Case 1:20-cv-00015-UNA Document 1-3 Filed 01/06/20 Page 12 of 21 PageID #: 76</small></p> <p data-bbox="342 877 386 1400"><b><i>Practicalities, Let's Get Real</i></b></p> <p data-bbox="418 653 493 1386">Switching in and out of continuous mode does not upset DPR control</p> <p data-bbox="524 594 600 1386">The signal transformer can be tiny, with a single stitch of wire each, for primary and secondary</p> <p data-bbox="630 594 821 1386">The primary side control chip can be a simplified version of an ordinary primary side control chip which needs only to generate one start-up pulse, to turn on the switch when a demand pulse is detected, and to shut off the switch at a preset current</p> <p data-bbox="852 594 927 1386">The key to building a practical DPR power converter is the secondary side circuitry</p> <div data-bbox="938 562 987 1411">  </div> <p data-bbox="992 352 1024 1411">APEC Presentation at 11 (red annotation added). See, also, '031 Patent at 7:15-22.</p>
<p data-bbox="1044 1434 1401 1900">6. The power converter controller of claim 1, wherein the secondary controller is coupled to transmit the request signals via a communication link, wherein the primary controller is coupled to receive the request signals via the communication link, and wherein the communication link includes at least one of an optical communication link, a capacitive</p>	<p data-bbox="1044 1171 1076 1411">See claim 1 above.</p> <p data-bbox="1117 338 1328 1411">The DPR Product includes the power converter controller of claim 1, wherein the secondary controller is coupled to transmit the request signals via a communication link, wherein the primary controller is coupled to receive the request signals via the communication link, and wherein the communication link includes at least one of an optical communication link, a capacitive communication link, and a magnetic communication link.</p>



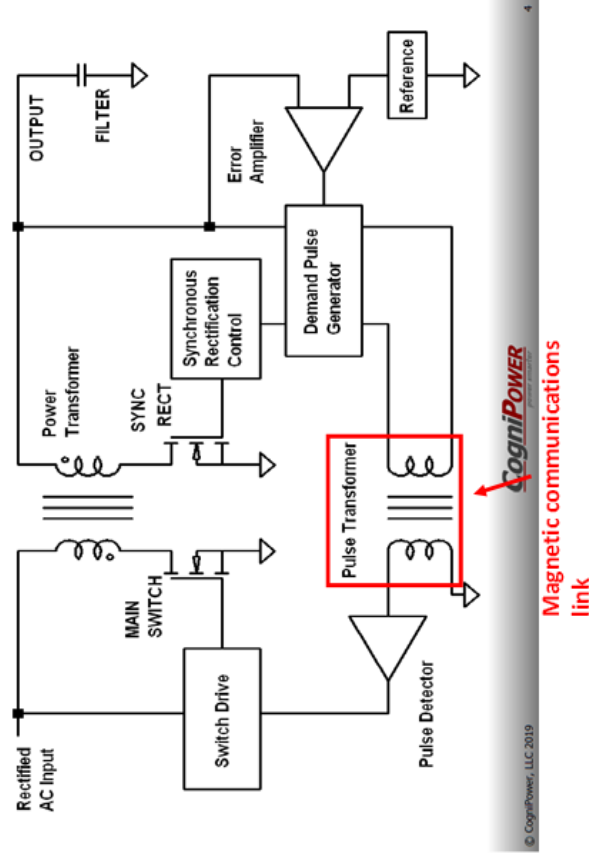
**'486 Patent Claim**

communication link, and a magnetic communication link.

**CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)**

The communication link between the secondary and primary controllers is a magnetic communications link (*i.e.* a pulse transformer), as shown in the APEC Presentation slide 5.

### Block Diagram of DPR Power Converter



APEC Presentation at 4 (red annotation added).

See claim 3 above.

7. The power converter controller of claim 3, wherein the minimum amount of time between the transmission of each of the one or more request signals sets a minimum

The DPR Product includes the power converter controller of claim 3, wherein the minimum amount of time between the transmission of each of the one or more



<p><b>'486 Patent Claim</b></p> <p>amount of time between two consecutive transitions of the power switch from the OFF state to the ON state.</p>	<p><b>CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")</b></p> <p>request signals sets a minimum amount of time between two consecutive transitions of the power switch from the OFF state to the ON state.</p> <p>A minimum amount of time between demand pulses translates into a maximum switching frequency, which is controlled by the demand pulse generator. <i>See, e.g.,</i> APEC Presentation at 13; <i>see also</i> APEC Presentation at 5-7.</p> <p>The '031 patent also describes an oscillator integrated into a secondary side controller that has a higher frequency than the frequency of the primary controller. <i>See, e.g.,</i> '031 patent at 6:59-63; 7:54-59. Because the secondary controller can generate demand pulses at a higher frequency, the minimum time between request signals sets the minimum time between when the primary switch can turn on in consecutive cycles.</p>
<p>8. The power converter controller of claim 3, wherein the timing circuit is coupled to operate in a first state until triggered to operate in a second state, wherein the timing circuit is in the second state for a holding period and transitions back to the first state at an end of the holding period, and wherein the holding period sets the minimum amount of time between the transmission of two consecutive request signals.</p>	<p><i>See</i> claim 3 above.</p> <p>The DPR Product includes the power converter controller of claim 3, wherein the timing circuit is coupled to operate in a first state until triggered to operate in a second state, wherein the timing circuit is in the second state for a holding period and transitions back to the first state at an end of the holding period, and wherein the holding period sets the minimum amount of time between the transmission of two consecutive request signals.</p> <p>As described in the '031 patent, the secondary controller timer circuit includes an oscillator, which operates in a first state (<i>e.g.</i> logic 1) and then is triggered to operate in a second state (<i>e.g.</i> logic 0) and remains in the second state for a holding period and transitions back to the first state at the end of the holding period. The logic 0 state/holding period sets the minimum time between request signals because no demand pulse can be sent to the primary when the oscillator is in its logic 0 state). <i>See, e.g.,</i> '031 patent at 7:62-8:24.</p>

<p><b>'486 Patent Claim</b></p>	<p><b>CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")</b></p>
<p>9. The power converter controller of claim 8, wherein the secondary controller includes a secondary switch control circuit coupled to sense an output quantity of the power converter and transmit one of the request signals to the primary controller when the a sensed output quantity is less than a desired output quantity and the timing circuit is in the first state, wherein the secondary switch control circuit triggers the timing circuit in response to transmitting the request signal.</p>	<p>See claim 8 above.</p> <p>The DPR Product includes the power converter controller of claim 8, wherein the secondary controller includes a secondary switch control circuit coupled to sense an output quantity of the power converter and transmit one of the request signals to the primary controller when the a sensed output quantity is less than a desired output quantity and the timing circuit is in the first state, wherein the secondary switch control circuit triggers the timing circuit in response to transmitting the request signal.</p> <p>The secondary controller of the DPR Product is coupled to sense an output quantity of the power converter and transmit one of the request signals to the primary controller when the a sensed output quantity is less than a desired output quantity and the timing circuit is in the first state: "Whenever the instantaneous output falls below the regulation point, a demand pulse is generated."</p>

**'486 Patent Claim**

**CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")**

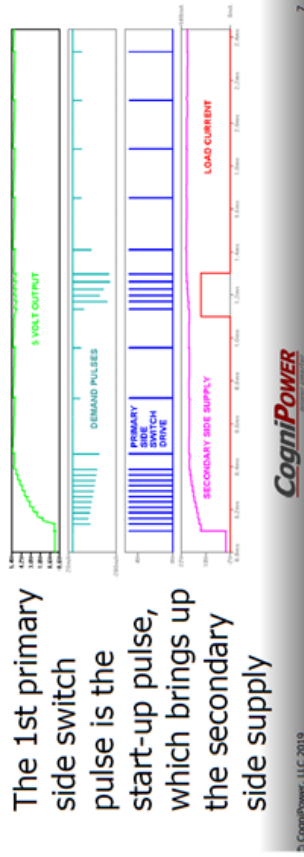
### *DPR Waveforms Explained*

Whenever the instantaneous output falls below the regulation point, a demand pulse is generated

At the left, during start-up, the demand pulses are sent at the maximum frequency allowed

Demand pulses are seen to spread out at low load

The 1st primary side switch pulse is the start-up pulse, which brings up the secondary side supply



APEC Presentation at 7 (red annotation added).

The secondary switch control circuit of the DPR Product triggers the timing circuit in response to transmitting the request signal: "the regulation intelligence resides on the secondary side."

**'486 Patent Claim**

**CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")**

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### *Digital Interfacing*

Because the regulation intelligence resides on the secondary side, digital interfacing is straightforward

Additional communication across the isolation barrier is not required when adding additional protocols

There is no compensated feedback loop required for regulation so the output can be simply set to an arbitrary, digitally chosen voltage



APEC Presentation at 10 (red annotation added).

The '031 patent also describes secondary switch control circuit that generates the request signals in response to the sensed output quantity and triggers the timing circuit in response to transmitting the request signal. *See, e.g., '031 patent at 8:4-38.* The secondary switch control inhibits demand pulses/request signals when the output is above a reference and generates the request signals when the output is less than the reference.

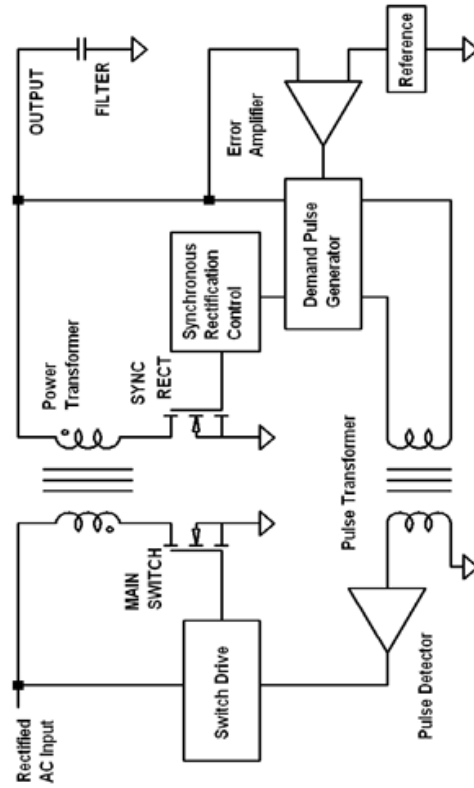
**'486 Patent Claim**

**CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")**

11. A power converter controller comprising:


The DPR Product includes a power converter controller.

### Block Diagram of DPR Power Converter




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APEC Presentation at 4 (red annotation added).

'486 Patent Claim	<p data-bbox="199 321 313 1413"><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <p data-bbox="329 583 378 1402"><b><u>Demand Pulse Regulation (DPR) Fits the Bill</u></b></p> <p data-bbox="435 625 508 1371">Demand Pulse Regulation is a new approach to low-power AC/DC supplies</p> <p data-bbox="548 657 630 1371">DPR provides the simplest, most robust structure yet devised for controlling such power converters</p> <p data-bbox="654 636 727 1371">Most of the control is on the secondary side, where the electrical environment is easier to deal with</p> <p data-bbox="768 720 849 1371">Regulation and transient response are uncompromised and digital interfacing is easy</p> <div data-bbox="914 562 963 1413">  <p data-bbox="946 1308 963 1413">CogniPower, LLC 2019</p> <p data-bbox="914 919 946 1066"><b>CogniPower</b></p> <p data-bbox="946 573 963 594">3</p> </div> <p data-bbox="971 814 1003 1413">APEC Presentation at 3 (red annotation added).</p> <p data-bbox="1044 394 1109 1413">In addition, the power converter controller is embodied in the physical products shown in the APEC Presentation.</p>
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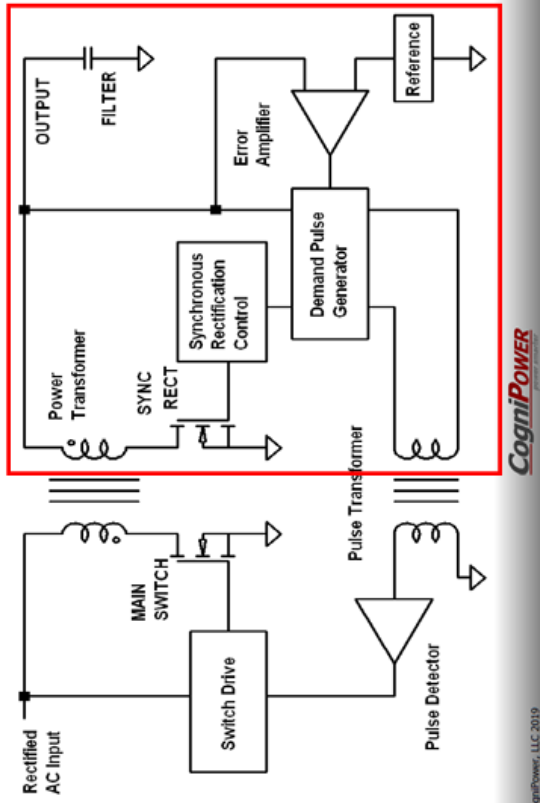


<p><b>'486 Patent Claim</b></p>	<p><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p>
	<div data-bbox="344 674 863 1396" data-label="Image"> </div> <div data-bbox="873 793 930 1255" data-label="Section-Header"> <h3>Early DPR Prototype</h3> </div> <div data-bbox="927 1081 964 1413" data-label="Text"> <p>APEC Presentation at 20.</p> </div> <div data-bbox="1003 598 1386 1409" data-label="Image"> </div> <div data-bbox="1383 1081 1421 1413" data-label="Text"> <p>APEC Presentation at 10.</p> </div>

<p><b>'486 Patent Claim</b></p>	<p><b>CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")</b></p>
<p>a secondary controller comprising:</p>	<p>The DPR Product includes a secondary controller.</p> <p>Because the regulation intelligence resides on the secondary side, digital interfacing is straightforward</p> <p>Additional communication across the isolation barrier is not required when adding additional protocols</p> <p>There is no compensated feedback loop required for regulation so the output can be simply set to an arbitrary, digitally chosen voltage</p>  <p>© CogniPower, LLC 2019</p> <p>APEC Presentation at 10.</p>



'486 Patent Claim	<p data-bbox="201 321 308 1409"><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <p data-bbox="329 699 347 1287"><small>Case 1:20-cv-00015-UNA Document 1-3 Filed 01/06/20 Page 12 of 21 PageID #: 76</small></p> <p data-bbox="342 877 386 1398"><b><i>Practicalities, Let's Get Real</i></b></p> <p data-bbox="418 653 493 1383">Switching in and out of continuous mode does not upset DPR control</p> <p data-bbox="524 594 600 1383">The signal transformer can be tiny, with a single stitch of wire each, for primary and secondary</p> <p data-bbox="631 604 820 1383">The primary side control chip can be a simplified version of an ordinary primary side control chip which needs only to generate one start-up pulse, to turn on the switch when a demand pulse is detected, and to shut off the switch at a preset current</p> <p data-bbox="850 594 927 1383"><b>The key to building a practical DPR power converter is the secondary side circuitry</b></p> <p data-bbox="946 1308 982 1409"><small>CogniPower, LLC 2019</small></p> <p data-bbox="946 915 976 1066"><b><i>CogniPower</i></b></p> <p data-bbox="971 562 982 577"><small>11</small></p> <p data-bbox="995 793 1024 1409">APEC Presentation at 11 (red annotation added).</p>
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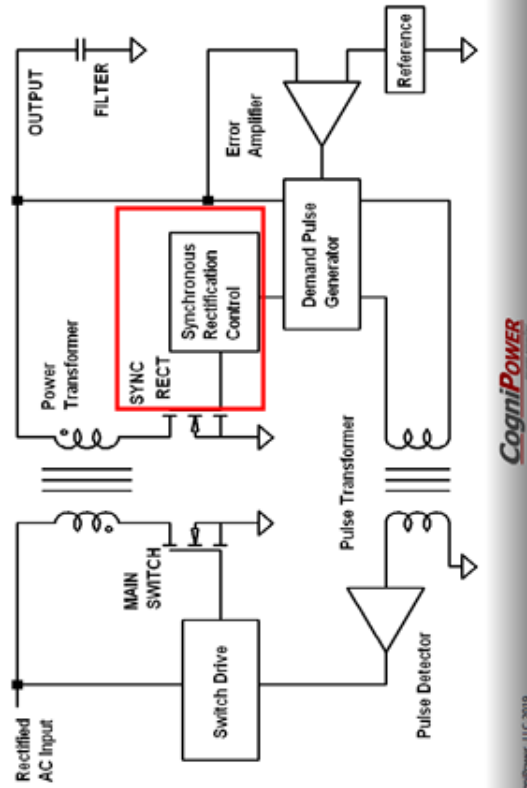
'486 Patent Claim	CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")
	<p><i>Block Diagram of DPR Power Converter</i></p>  <p>APEC Presentation at 4 (red annotation added).</p>
a timing circuit coupled to operate in a first state until triggered to operate in a second state, wherein the timing circuit is in the second state for a holding period and transitions back to the first state at an end of the holding period; and	<p>The DPR Product includes a timing circuit coupled to operate in a first state until triggered to operate in a second state, wherein the timing circuit is in the second state for a holding period and transitions back to the first state at an end of the holding period.</p> <p>CogniPower has taken the position that the DPR Product is an embodiment of CogniPower's patent RE47,031 (the "'031 patent"). Based on CogniPower's contention, the recited timing circuit is also shown in the '031 patent, which recites, for example, an "output-side blocking oscillator 503b." (See, e.g., '031 patent at 5:23-30). The timing circuit includes an oscillator that operates in a first state (e.g. logic 1) and then is triggered to operate in a second state (e.g. logic 0) and remains in the</p>

<b>'486 Patent Claim</b>	<b>CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")</b>
	second state for a holding period and transitions back to the first state at the end of the holding period. <i>See, e.g.</i> , '031 patent at 7:62-8:3.
a secondary switch control circuit coupled to sense an output quantity of a power converter and transmit a request signal when the a sensed output quantity is less than a desired output quantity and the timing circuit is in the first state, wherein the secondary switch control circuit triggers the timing circuit in response to transmitting the request signal;	<p>The DPR Product includes a secondary switch control circuit coupled to sense an output quantity of a power converter and transmit a request signal when the a sensed output quantity is less than a desired output quantity and the timing circuit is in the first state, wherein the secondary switch control circuit triggers the timing circuit in response to transmitting the request signal.</p> <p>The recited secondary switch control circuit may be found inside of the "Synchronous Rectification Control" block of the DPR Block Diagram, which generates a control signal to control a second switch, which by way of example only, may be the switch labelled "SYNC RECT".</p>

'486 Patent Claim

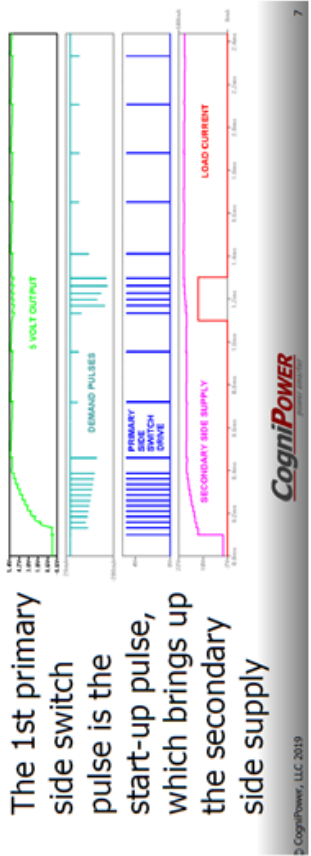
CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")

### Block Diagram of DPR Power Converter



APEC Presentation at 4 (red annotation added).

The recited request signal is the "demand pulse" that is generated when the sensed output is less than the desired output quantity, or regulation point.

'486 Patent Claim	CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")
	<p><i>DPR Waveforms Explained</i></p> <p>Whenever the instantaneous output falls below the regulation point, a demand pulse is generated</p> <p>At the left, during start-up, the demand pulses are sent at the maximum frequency allowed</p> <p>Demand pulses are seen to spread out at low load</p> <p>The 1st primary side switch pulse is the start-up pulse, which brings up the secondary side supply</p>  <p>APEC Presentation at 7 (red annotation added).</p> <p>The '031 patent also describes secondary switch control circuit that generates the request signals in response to the sensed output quantity and triggers the timing circuit in response to transmitting the request signal. See, e.g., '031 patent at 8:4-38. The secondary switch control inhibits demand pulses/request signals when the output is above a reference and generates the request signals when the output is less than the reference.</p>
a primary controller to be coupled to a power switch of the power converter and galvanically isolated from the secondary controller,	The DPR Product includes a primary controller to be coupled to a power switch of the power converter and galvanically isolated from the secondary controller, wherein the primary controller is coupled to receive the transmitted request signal and set the power switch into an ON state in response to the request signal, and wherein the

**'486 Patent Claim**

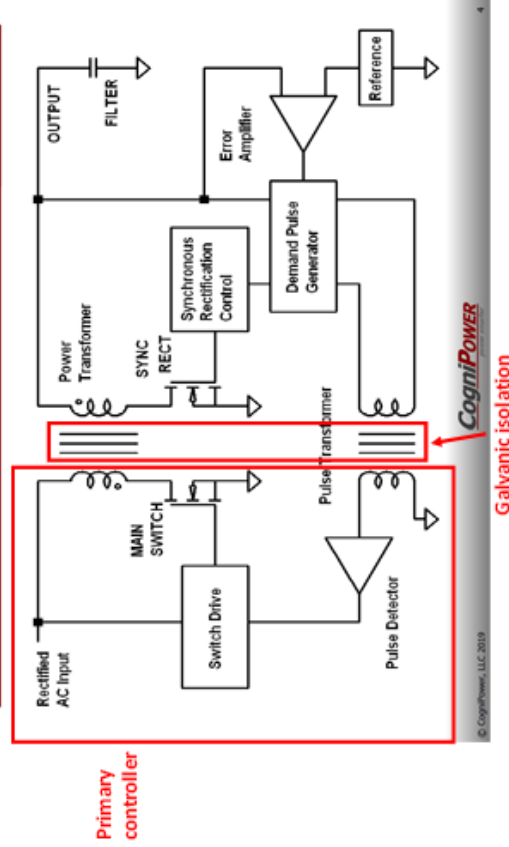
wherein the primary controller is coupled to receive the transmitted request signal and set the power switch into an ON state in response to the request signal, and wherein the primary controller is coupled to detect a turn-off condition and transition the power switch from the ON state to an OFF state in response to detection of the turn-off condition,

**CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)**

primary controller is coupled to detect a turn-off condition and transition the power switch from the ON state to an OFF state in response to detection of the turn-off condition.

The secondary controller is galvanically isolated from the primary controller.

*Block Diagram of DPR Power Converter*



APEC Presentation at 4 (red annotation added).

The “transmitted request signal” is analogous to the DPR Products “Demand pulses,” shown below in slide 5 of the APEC Presentation. The DPR Product includes circuitry wherein the primary controller is coupled to receive a transmitted request signals and set the power switch to an ON state in response to the received request signals. For example, according to the APEC Presentation, “[t]he primary side side (sic) switch is turned on by demand pulses sent through the pulse transformer.”

**'486 Patent Claim**

**CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)**

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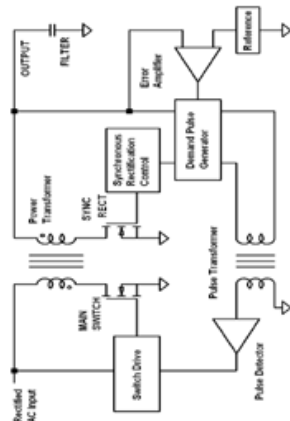
### *How Does it Work?*

The primary side switch is turned on by demand pulses sent through the pulse transformer

The primary side switch is turned off by the switch drive control on the basis of the primary current or time

The decision to turn on the switch is made at the optimum point through a simple comparison

The only information that needs to cross the barrier is an instant in time



**CogniPower**

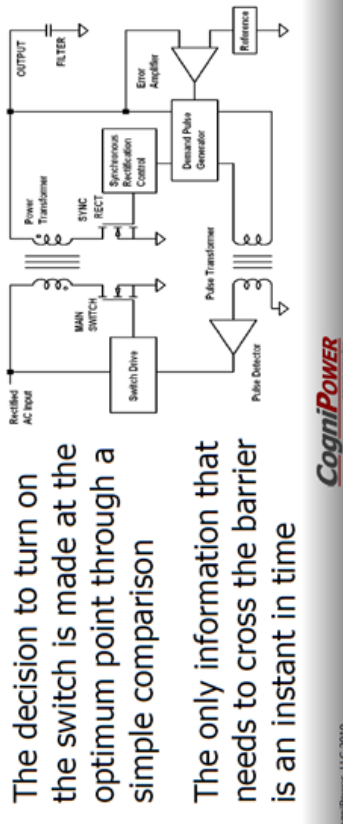
CogniPower, LLC 2019

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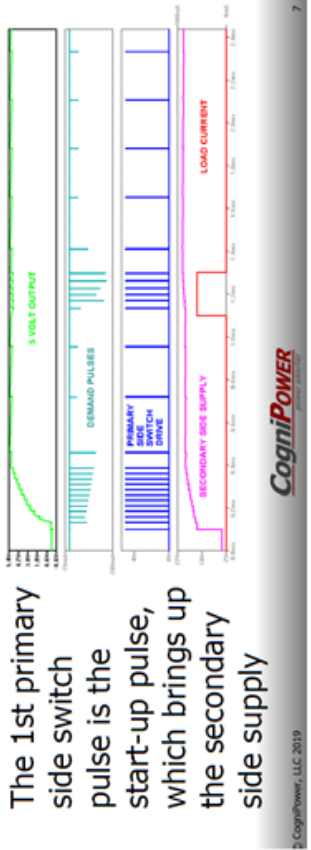
APEC Presentation at 5 (red annotation added).

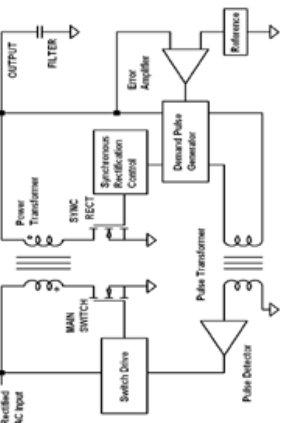
Further, the DPR Product includes circuitry wherein the primary controller is coupled to detect a turn-off condition when the power switch is in the ON state and transition the power switch from the ON state to the OFF state in response to detection of the turn-off condition.”

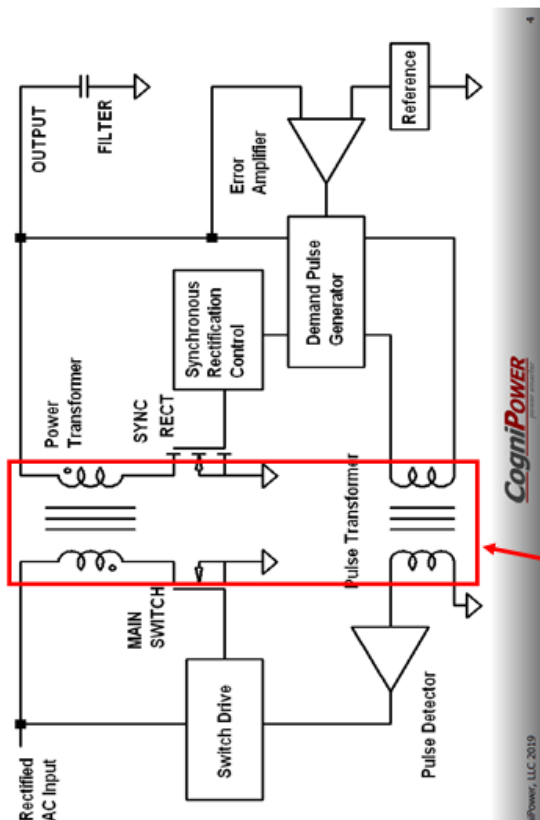


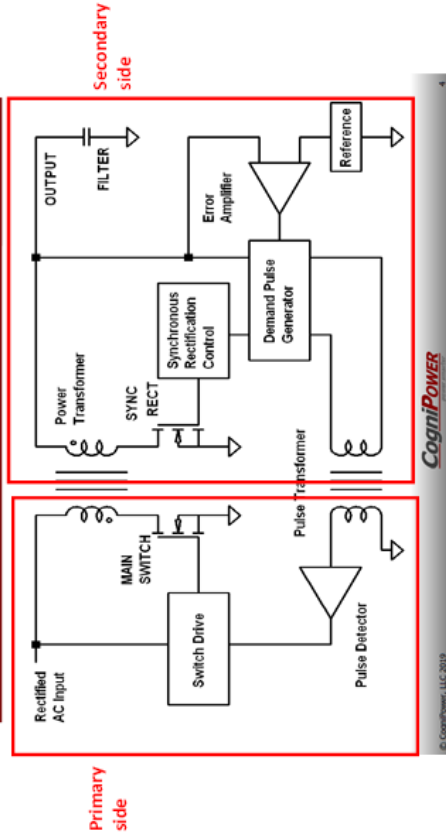
'486 Patent Claim	<p><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <p>Case 1:20-cv-00015-UNA Document 1-3 Filed 01/06/20 Page 6 of 21 PageID #: 70</p> <p><b><i>How Does it Work?</i></b></p> <p>The primary side switch is turned on by demand pulses sent through the pulse transformer</p> <p>The primary side switch is turned off by the switch drive control on the basis of the primary current or time</p> <p>The decision to turn on the switch is made at the optimum point through a simple comparison</p> <p>The only information that needs to cross the barrier is an instant in time</p>  <p>APEC Presentation at 5 (red annotation added). See also APEC Presentation at 11.</p>
wherein the primary controller is configured to maintain the power switch in the OFF state for a threshold period of time after transitioning the power switch to the OFF state, and wherein the primary controller is configured to refrain from setting the power switch into the ON state in response to a	<p>The DPR Product includes wherein the primary controller is configured to maintain the power switch in the OFF state for a threshold period of time after transitioning the power switch to the OFF state, and wherein the primary controller is configured to refrain from setting the power switch into the ON state in response to a subsequent request signal received during the threshold period of time.</p> <p>The primary converter controller is configured to maintain the power switch in the OFF state for a threshold period of time after transitioning the power switch to the OFF state.</p>



<p><b>'486 Patent Claim</b></p> <p>subsequent request signal received during the threshold period of time.</p>	<p><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <p><b><i>DPR Waveforms Explained</i></b></p> <p>Whenever the instantaneous output falls below the regulation point, a demand pulse is generated</p> <p>At the left, during start-up, the demand pulses are sent at the maximum frequency allowed</p> <p>Demand pulses are seen to spread out at low load</p> <p>The 1st primary side switch pulse is the start-up pulse, which brings up the secondary side supply</p>  <p><small>© CogniPower, LLC 2019</small></p> <p>APEC Presentation at 5 (red annotation added).</p> <p>The primary controller is configured to refrain from setting the power switch into the ON state in response to a subsequent request signal received during the threshold period of time.</p>
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'486 Patent Claim	<p data-bbox="203 321 305 1409"><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <p data-bbox="337 703 354 1268">Case 1:20-cv-00015-UNA Document 1-3 Filed 01/06/20 Page 6 of 21 PageID #: 70</p> <p data-bbox="354 1024 394 1381"><b><i>How Does it Work?</i></b></p> <p data-bbox="435 632 508 1381">The primary side switch is turned on by demand pulses sent through the pulse transformer</p> <p data-bbox="537 585 610 1381">The primary side switch is turned off by the switch drive control on the basis of the primary current or time</p> <div data-bbox="630 577 971 1381"> <p data-bbox="638 1014 784 1375">The decision to turn on the switch is made at the optimum point through a simple comparison</p> <p data-bbox="816 1014 922 1375">The only information that needs to cross the barrier is an instant in time</p>  <p data-bbox="943 913 971 1402">CogniPower, LLC 2019</p> </div> <p data-bbox="984 808 1016 1409">APEC Presentation at 5 (red annotation added).</p> <p data-bbox="1057 321 1195 1409">Further, the '031 patent states that “it is desirable to limit maximum frequency of these ON times.” The use of a maximum frequency limit in the primary controller is the same as setting a minimum time in which the power switch cannot be switched to the ON state. See, e.g., '031 patent at 7:38-46.</p> <p data-bbox="1219 1157 1243 1409">See claim 11 above.</p> <p data-bbox="1292 321 1395 1409">The DPR Product includes the power converter controller of claim 11, wherein the power converter is an isolated power converter, wherein the secondary controller is configured to be coupled to a secondary side of the power converter, and wherein the</p>
13. The power converter controller of claim 11, wherein the power converter is an isolated power converter, wherein the secondary controller is configured to be	

<p><b>'486 Patent Claim</b></p>	<p>coupled to a secondary side of the power converter, and wherein the primary controller is configured to be coupled to a primary side of the power converter.</p>	<p>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</p> <p>primary controller is configured to be coupled to a primary side of the power converter.</p> <p>The secondary controller is galvanically isolated from the primary controller.</p> <p><i><b>Block Diagram of DPR Power Converter</b></i></p>  <p>Galvanic isolation</p> <p>APEC Presentation at 4 (red annotation added).</p> <p>The secondary controller is configured to be coupled to a secondary side of the power converter, and the primary controller is configured to be coupled to a primary side of the power converter.</p>
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'486 Patent Claim	CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")
16. The power converter controller of claim 11, wherein the request signal is a pulse, and wherein the primary controller is coupled to receive the pulse and set the power switch into the ON state in response to the pulse.	<p><i>Block Diagram of DPR Power Converter</i></p>  <p>The diagram illustrates the block architecture of a DPR Power Converter, divided into a Primary side and a Secondary side. On the Primary side, a Rectified AC Input feeds a MAIN SWITCH, which is driven by a Switch Drive. A Pulse Detector is coupled to the MAIN SWITCH to generate a Pulse signal. On the Secondary side, a Power Transformer is connected to a SYNC RECT block, which feeds a Synchronous Rectification Control block. This control block is also connected to a Demand Pulse Generator. The Demand Pulse Generator receives a Reference signal and provides a feedback signal to an Error Amplifier. The Error Amplifier's output is fed back to the Synchronous Rectification Control. The output of the Secondary side is filtered by an OUTPUT FILTER. The diagram is labeled 'CogniPower' and '© CogniPower, LLC 2019'.</p> <p>APEC Presentation at 4 (red annotation added).</p> <p>See claim 11 above.</p> <p>The DPR Product includes the power converter controller of claim 11, wherein the request signal is a pulse, and wherein the primary controller is coupled to receive the pulse and set the power switch into the ON state in response to the pulse.</p>

**'486 Patent Claim**

**CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)**

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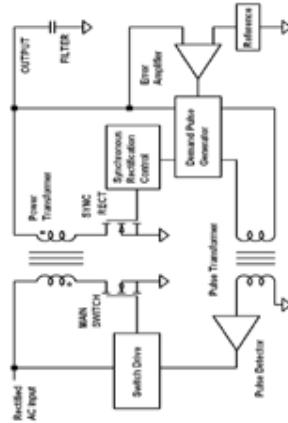
### *How Does it Work?*

**The primary side switch is turned on by demand pulses sent through the pulse transformer**

The primary side switch is turned off by the switch drive control on the basis of the primary current or time

The decision to turn on the switch is made at the optimum point through a simple comparison

The only information that needs to cross the barrier is an instant in time

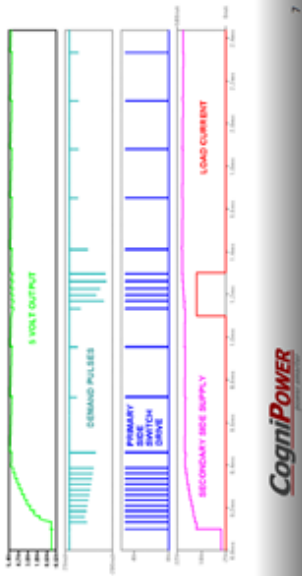


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CogniPower, LLC 2019

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APEC Presentation at 5 (red annotation added).

'486 Patent Claim	CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")
	<p><i><b>DPR Waveforms Explained</b></i></p> <p>Whenever the instantaneous output falls below the regulation point, a demand pulse is generated</p> <p>At the left, during start-up, the demand pulses are sent at the maximum frequency allowed</p> <p>Demand pulses are seen to spread out at low load</p> <p>The 1st primary side switch pulse is the start-up pulse, which brings up the secondary side supply</p>  <p>APEC Presentation at 7 (red annotation added).</p>
17. The power converter controller of claim 11, wherein the turn-off condition includes a threshold current limit, wherein the primary controller is coupled to sense an amount of current through the power switch when the power switch is in the ON state, and wherein the primary controller is coupled to transition the power switch from the ON state to the OFF state when the amount of current through the power switch is greater than the threshold current limit.	<p>See claim 11 above.</p> <p>The DPR Product includes the power converter controller of claim 11, wherein the turn-off condition includes a threshold current limit, wherein the primary controller is coupled to sense an amount of current through the power switch when the power switch is in the ON state, and wherein the primary controller is coupled to transition the power switch from the ON state to the OFF state when the amount of current through the power switch is greater than the threshold current limit.</p> <p>The turn-off condition includes a threshold current limit.</p>

**'486 Patent Claim**

amount of current through the power switch is greater than the threshold current limit.

**CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)**

Case 1:20-cv-00015-LUNA Document 1-3 Filed 01/06/20 Page 6 of 21 PageID #: 70

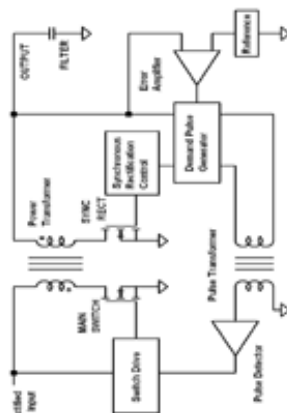
### *How Does it Work?*

The primary side switch is turned on by demand pulses sent through the pulse transformer

The primary side switch is turned off by the switch drive control on the basis of the primary current or time

The decision to turn on the switch is made at the optimum point through a simple comparison

The only information that needs to cross the barrier is an instant in time




CogniPower, LLC 2019  
**CogniPower**

APEC Presentation at 5 (red annotation added).

The primary controller is coupled to transition the power switch from the ON state to the OFF state when the amount of current through the power switch is greater than the threshold current limit.



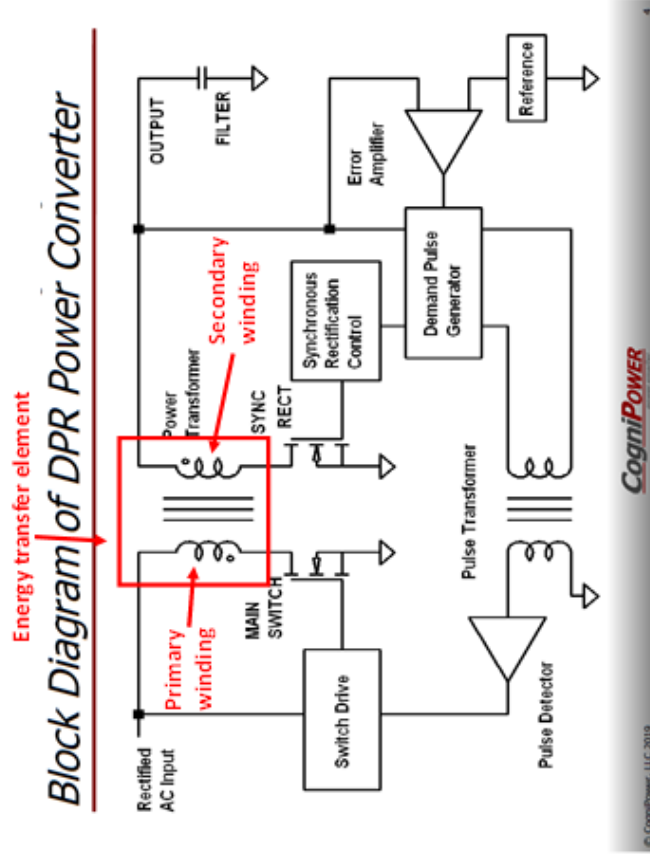
'486 Patent Claim	<p>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</p> <p><i>Practicalities, Let's Get Real</i></p> <p>Switching in and out of continuous mode does not upset DPR control</p> <p>The signal transformer can be tiny, with a single stitch of wire each, for primary and secondary</p> <p>The primary side control chip can be a simplified version of an ordinary primary side control chip which needs only to generate one start-up pulse, to turn on the switch when a demand pulse is detected, and to shut off the switch at a preset current</p> <p>The key to building a practical DPR power converter is the secondary side circuitry</p>  <p>APEC Presentation at 11 (red annotation added). See, also, '031 Patent at 7:15-22.</p>
18. The power converter controller of claim 11, wherein the turn-off condition includes a threshold amount of time, and wherein the primary controller is coupled to transition the power switch from the ON state to the OFF state when the power switch has been in the ON state for the threshold amount of time.	<p>See claim 11 above.</p> <p>The DPR Product includes the power converter controller of claim 11, wherein the turn-off condition includes a threshold amount of time, and wherein the primary controller is coupled to transition the power switch from the ON state to the OFF state when the power switch has been in the ON state for the threshold amount of time.</p> <p>The turn-off condition includes a threshold amount of time.</p>



<b>'486 Patent Claim</b>	<b>CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")</b>
	The '031 patent describes that the primary controller also implemented a threshold amount of time that the primary switch would be allowed to stay on. <i>See, e.g.</i> , '031 patent at 7:31-37.
20. The power converter controller of claim 11, wherein the secondary controller is coupled to transmit the request signal via a communication link, wherein the primary controller is coupled to receive the request signal via the communication link, and wherein the communication link includes at least one of an optical communication link, a capacitive communication link, and a magnetic communication link.	<i>See</i> claims 11 and 6, above.
21. A power converter comprising:	The DPR Product is a power converter.
an energy transfer element comprising a primary winding on a primary side of the power converter and a secondary winding on a secondary side of the power converter;	The DPR Product includes an energy transfer element comprising a primary winding on a primary side of the power converter and a secondary winding on a secondary side of the power converter.

'486 Patent Claim

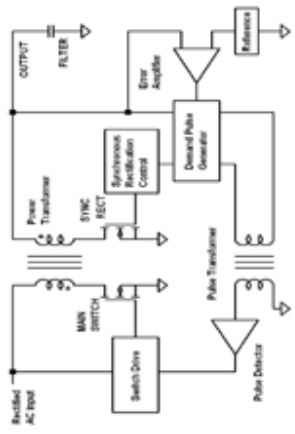
CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")

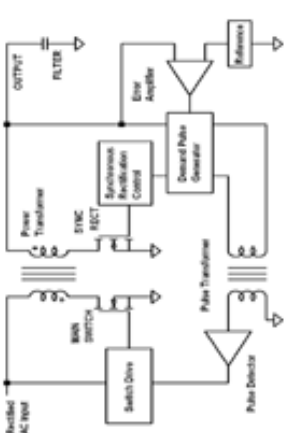



APEC Presentation at 4 (red annotation added).

a power switch coupled to the primary winding;  
The DPR Product includes a power switch coupled to the primary winding

<p>’486 Patent Claim</p>	<p>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</p> <p><i>Block Diagram of DPR Power Converter</i></p> <p>APEC Presentation at 4 (red annotation added).</p>	<p>The DPR Product includes a primary controller coupled to the power switch, wherein the primary controller is coupled to receive one or more request signals from the secondary side and transition the power switch from an OFF state to an ON state in response to each of the one or more received request signals, and wherein the primary controller is coupled to detect a turn-off condition when the power switch is in the ON state and transition the power switch from the ON state to the OFF state in response to detection of the turn-off condition.</p> <p>The “one or more request signals” are analogous to the DPR Products “Demand pulses,” shown below in slide 5 of the APEC Presentation. The DPR Product includes circuitry wherein the primary controller is coupled to receive one or more</p>
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<p><b>'486 Patent Claim</b></p>	<p><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <p>request signals and transition the power switch from an OFF state to an ON state in response to each of the one or more received request signals. For example, according to the APEC Presentation, “[t]he primary side side (sic) switch is turned on by demand pulses sent through the pulse transformer.”</p> <p><i>How Does it Work?</i></p> <p>The primary side side switch is turned on by demand pulses sent through the pulse transformer</p> <p>The primary side switch is turned off by the switch drive control on the basis of the primary current or time</p> <p>The decision to turn on the switch is made at the optimum point through a simple comparison</p> <p>The only information that needs to cross the barrier is an instant in time</p>  <p><i>CogniPower</i> CogniPower, LLC 2019</p> <p>APEC Presentation at 5 (red annotation added).</p> <p>Further, the DPR Product includes circuitry wherein the primary controller is coupled to detect a turn-off condition when the power switch is in the ON state and transition the power switch from the ON state to the OFF state in response to detection of the turn-off condition.”</p>
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'486 Patent Claim	<p data-bbox="201 321 306 1409"><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <p data-bbox="337 705 355 1268">Case 1:20-cv-00015-JUNA Document 1-3 Filed 01/06/20 Page 6 of 21 PageID #: 70</p> <p data-bbox="355 1024 396 1381"><b><i>How Does it Work?</i></b></p> <p data-bbox="435 636 508 1381">The primary side switch is turned on by demand pulses sent through the pulse transformer</p> <p data-bbox="537 583 610 1381"><b>The primary side switch is turned off by the switch drive control on the basis of the primary current or time</b></p> <p data-bbox="639 1016 786 1381">The decision to turn on the switch is made at the optimum point through a simple comparison</p> <p data-bbox="815 1016 920 1381">The only information that needs to cross the barrier is an instant in time</p>  <p data-bbox="938 913 966 1060"><b>CogniPower</b></p> <p data-bbox="961 1295 971 1402">CogniPower, LLC 2019</p> <p data-bbox="982 352 1015 1409">APEC Presentation at 5 (red annotation added). See also APEC Presentation at 11.</p> <p data-bbox="1032 321 1211 1409">The DPR Product includes a secondary controller coupled to the secondary side and galvanically isolated from the primary controller, wherein the secondary controller is coupled to transmit the one or more request signals to the primary controller, and wherein the secondary controller is coupled to control an amount of time between the transmission of each of the one or more request signals.</p>
a secondary controller coupled to the secondary side and galvanically isolated from the primary controller, wherein the secondary controller is coupled to transmit the one or more request signals to the primary controller, and wherein the secondary controller is coupled to control an amount of time between	

<p><b>'486 Patent Claim</b></p>	<p><b>CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")</b></p>
<p>the transmission of each of the one or more request signals,</p>	<p>Because the regulation intelligence resides on the secondary side, digital interfacing is straightforward</p> <p>Additional communication across the isolation barrier is not required when adding additional protocols</p> <p>There is no compensated feedback loop required for regulation so the output can be simply set to an arbitrary, digitally chosen voltage</p>  <p>© CogniPower, LLC 2019</p> <p>APEC Presentation at 10.</p>

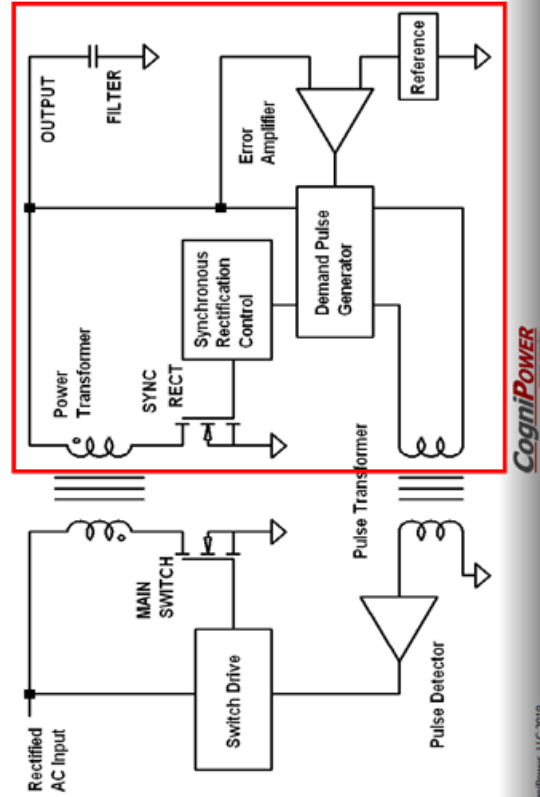
'486 Patent Claim	<p data-bbox="201 321 306 1409"><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <div data-bbox="313 308 1058 1417"> <p data-bbox="329 695 347 1283"><small>Case 1:20-cv-00015-UNA Document 1-3 Filed 01/06/20 Page 12 of 21 PageID #: 76</small></p> <p data-bbox="342 873 386 1398"><b><i>Practicalities, Let's Get Real</i></b></p> <p data-bbox="418 653 493 1383">Switching in and out of continuous mode does not upset DPR control</p> <p data-bbox="526 594 600 1383">The signal transformer can be tiny, with a single stitch of wire each, for primary and secondary</p> <p data-bbox="631 604 818 1383">The primary side control chip can be a simplified version of an ordinary primary side control chip which needs only to generate one start-up pulse, to turn on the switch when a demand pulse is detected, and to shut off the switch at a preset current</p> <p data-bbox="850 594 925 1383"><b>The key to building a practical DPR power converter is the secondary side circuitry</b></p> <div data-bbox="938 558 985 1409"> <p data-bbox="948 1308 980 1409"><small>CogniPower, LLC 2019</small></p> <p data-bbox="948 915 980 1068"><b><i>CogniPower</i></b></p> <p data-bbox="972 558 985 579"><small>11</small></p> </div> <p data-bbox="993 791 1024 1409">APEC Presentation at 11 (red annotation added).</p> </div>
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**'486 Patent Claim**

**CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)**

### *Block Diagram of DPR Power Converter*



APEC Presentation at 4 (red annotation added).

wherein the turn-off condition is a threshold current limit and the primary controller is coupled to adjust the threshold current limit in response to an amount of time the power switch is in the ON state.

The DPR Product includes the turn-off condition is a threshold current limit and the primary controller is coupled to adjust the threshold current limit in response to an amount of time the power switch is in the ON state.

The secondary controller of the DPR product is coupled to control an amount of time between the transmission of each of the request signals: “Whenever the instantaneous output falls below the regulation point, a demand pulse is generated.”

**'486 Patent Claim**

**CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)**

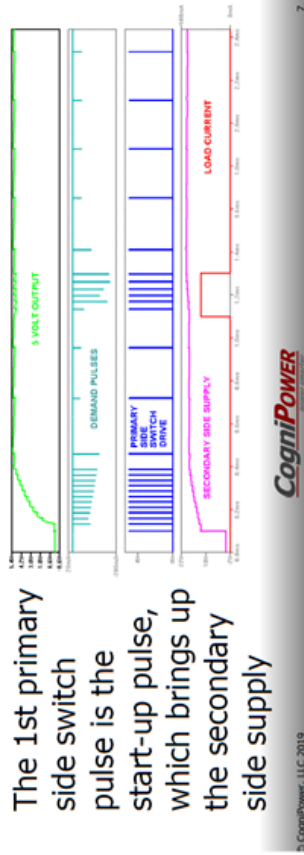
### *DPR Waveforms Explained*

Whenever the instantaneous output falls below the regulation point, a demand pulse is generated


At the left, during start-up, the demand pulses are sent at the maximum frequency allowed

Demand pulses are seen to spread out at low load

The 1st primary side switch pulse is the start-up pulse, which brings up the secondary side supply



APEC Presentation at 7 (red annotation added).

'486 Patent Claim	<p><b>CogniPower 2019 APEC presentation “Simplifying Efficient Low Power AC/DC Converters” (“APEC Presentation”) and associated prototype product based on Demand Pulse Regulation (“DPR Product”)</b></p> <p><b><u>Functions Provided by the DP Generator</u></b></p> <p>The DPG makes a very fast current pulse from a slowly changing error signal, while using practically no power</p> <p>That very fast edge propagates easily through a minimal, inexpensive, non-critical pulse transformer</p> <p>The DPG sets the maximum frequency of operation</p> <p>The DPG output frequency is in proportion to the magnitude of the error signal, allowing smooth operation, even into and out of continuous conduction</p> <p>And, the DPG itself does not require regulated power</p> <div data-bbox="906 552 959 1413">  </div>
22. The power converter of claim 21, wherein the secondary controller includes a timing circuit that sets a minimum amount of time between the transmission of each of the request signals.	<p>See claims 21 and 3, above.</p>
23. The power converter of claim 21, further comprising a communication link, wherein the secondary controller is coupled to transmit the one or more request	<p>See claims 21 and 6, above.</p>

'486 Patent Claim	CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")
signals via the communication link, wherein the primary controller is coupled to receive the one or more request signals via the communication link, and wherein the communication link includes at least one of an optical communication link, a capacitive communication link, and a magnetic communication link.	
25. The power converter of claim 22, wherein the timing circuit is coupled to operate in a first state until triggered to operate in a second state, wherein the timing circuit is in the second state for a holding period and transitions back to the first state at an end of the holding period, and wherein the holding period sets a minimum amount of time between the transmission of two consecutive request signals.	See claims 22 and 8, above.
26. The power converter of claim 25, wherein the secondary controller includes a secondary switch control circuit coupled to sense an output quantity of the power converter and transmit one of the request signals to the primary controller when the	See claims 25 and 9 above.

<b>'486 Patent Claim</b>	<b>CogniPower 2019 APEC presentation "Simplifying Efficient Low Power AC/DC Converters" ("APEC Presentation") and associated prototype product based on Demand Pulse Regulation ("DPR Product")</b>
sensed output quantity is less than a desired output quantity and the timing circuit is in the first state, and wherein the secondary switch control circuit triggers the timing circuit in response to transmitting the one or more request signal.	